TRENDS IN CORPORATE PROFITABILITY AND CAPITAL COSTS

Daniel M. Holland and Stewart C. Myers

Sloan School of Management
Massachusetts Institute of Technology

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I. OBJECTIVES AND MAJOR CONCLUSIONS

One striking aspect of the U.S. economy's performance during the last decade is the decline in the rate of return on corporate capital. The potential significance of this "fact" is clear but its actual significance is not. The decline may or may not indicate a basic structural shift in the U.S. economy. It may reflect a serious weakness, a natural and benign result of market forces, or something in between. Which interpretation is correct depends on several considerations, particularly the following.

1. Whether the decline is serious depends on the level from which it starts. If the mid-1960s was a period of unusually high profitability, then the subsequent decline may merely be a return to normal levels.
2. The trend's importance depends on whether the cost of capital has declined proportionally. If it has, then the falling rate of return need not, in itself, be cause for concern.

We have attempted to clarify the issues posed by declining corporate profitability over the last decade, to evaluate the evidence for longer-term trends in profitability, and to provide additional evidence about causes and consequences. Our essay is organized around two simple questions.

1. How have U.S. non-financial corporations (NFCs) fared?
2. How have rates of return on real capital held by NFCs behaved relative to capital costs?

We answer the first question by determining how well investors in NFCs have done. That is, we argue that the best measures of the performance of the NFC sector are based on changes in the capital market's aggregate valuation of the securities issued by the firms in that sector. We answer the second question by examining rates of return on the capital stock of NFCs. In most cases we have looked as far back in time as the available data permit -- usually to 1929 -- but most of our analysis is directed towards the postwar period from 1946 through 1967

Our main conclusions are the following:

1. Non-financial corporations have fared poorly since the mid-1960s. That fact is evident from the most casual examination of stock market data, and it stands up to careful examination. On the other hand, NFC performance in the postwar period ending in 1965 was excellent.
2. When the market value of NFC securities is measured relative to the net reproduction cost of real capital held by NFCs the mid-1960s is revealed as an unusually favorable period. However, today's market values are not unusually low compared to values prevailing in, say, the 1950s. Instead of asking why today's performance is poor, we might better ask why performance in the early and mid-1960s was so good.
3. Rates of return on real capital show the same pattern as market values: exceptional performance in the mid-1960s followed by a decline to levels more typical of the early postwar period.

4. Real costs of capital seem to have been stable since about 1956. Since then, fluctuations in the market value of non-financial corporations have been much more closely related to changes in operating profitability than to changes in capitalization rates.

The implications of our findings are discussed in the concluding section of this essay. We also note several areas in which further research would be fruitful.

II. THE PERFORMANCE OF NON-FINANCIAL CORPORATIONS

Introduction

We are concerned with the profitability of non-financial corporations in the aggregate. Although NFCs by no means account for the entire private sector, they are the major part of it. More than half of Gross Domestic Product (GDP) originates in the NFC sector. NFCs account for more than 90 percent of corporate GDP and more than 60 percent of total business GDP. The net replacement cost of assets held by NFCs now exceeds $1.3 trillion. Thus, the past performance and current health of this sector is a matter of interest and concern.

It is a widely accepted fact (a fact that we reconfirm in Section III) that NFC profitability has fallen sharply since 1965. Is this evidence of relatively poor performance conclusive and unambiguous? Not entirely so. There are a number of difficulties.

1. The rate of return on capital can be computed in countless ways. Some indicate a more serious decline than others. The National Income Accounts provide several different estimates of depreciation, for example. Each implies a different measure of income, a different value for net capital stock, and a different rate of return.
2. What is to be included in capital stock? Most estimates for NFCs aggregate include only the net replacement cost of inventory and physical capital (buildings, machinery and equipment). Land is usually excluded; its true value is extremely difficult to measure in any case. So is net working capital.
3. What about intangible assets? These include, for example, the extra value

of a going concern over a random collection of physical assets, and the value of cumulative expenditures on research, marketing, and employee training. The extra costs incurred in a period of learning-by-doing are a relevant asset that is almost never shown on corporate balance sheets. Firms acquire valuable investment opportunities by virtue of past activities.[2/] Monopoly power is an asset from the investor's viewpoint.

The problems implicit in these questions have absorbed many man-years of study. Despite this work, problems remain: rates of return calculated from accounting data will never be entirely free of errors of definition and measurement. Of course these statistics are indispensable for many purposes. But they are not ideally suited for determining how business firms fared over the last decade or some longer period.

There is a simple alternative. The value of the firm is not determined by the cumulative funds invested in it, or by the net replacement cost of its stock of real capital, but by the stream of earnings investors expect it to generate. The value of this stream at any time can be observed directly by summing the market value of all of the firm's outstanding securities. That is the true value of all the firm's assets. The income realized in any particular period can be found by adding the cash payments received by investors to the change in the market value of the firm's securities over the period, computed net of any new issues of securities. The rate of return earned by investors in that firm is found by dividing income by start-of-period market value.

In short, we propose to answer the question, "How well have non-financial corporations performed?" by using capital market data.

There may be some resistance to the idea of using stock and bond values to answer so fundamental a question. Many regard the stock market as irrational, and therefore an untrustworthy source of information about real phenomena. We believe such suspicions are unfounded.

Some make the elementary logical error of confusing volatility with irrationality. There is no necessary connection. The stock market is a major locus for risk-bearing. In our view the stock market's volatility accurately reflects the high degree of uncertainty actually existing in the economy. In fact, we distrust accounting estimates of firm values precisely because they are so stable.

Some doubts may stem from conceit, in the form of an individual's belief that he or she has a more accurate assessment of value than capital markets can provide. Often this belief is based on hindsight. The belief is suspect anyway, because so few professional investors -- who are presumably the most knowledgeable -- have been able to outperform the market consistently.[3/]

Some doubts may reflect the inability to explain the day-to-day or week-to-week movements of the stock market. Yet it is intellectual arrogance to assume that something that cannot be explained is irrational or meaningless. In any case, we are concerned not with short-term market fluctuations, but with market behavior over a period of many years.

There is good evidence that capital markets are efficient, in the sense of responding promptly and accurately to new information.[4/] That is the main reason why we use capital market data with confidence.

Rates of Return to Investors in Non-Financial Corporations

Consider a portfolio containing all the debt and equity securities issued by NFCs. That portfolio's aggregate market value, MV, is the market's estimate of the present value of the stream of future earnings[5] which investors expect NFCs to generate.

An investment in this portfolio would have generated income in the form of cash interest and dividend payments and also in the form of capital gains and losses. Thus we can calculate the rate of return earned by the portfolio in year t by estimating total income for year t and dividing by MV_t, the portfolio's market value at the start of the year. Let this rate of return be R_t.[6]

Note that R_t is not the rate of return earned by NFC stockholders. We are concerned with the performance of the entire NFC sector, not with the return received by holders of a claim on part of that sector's earnings.[7] Stockholders may have gained at the expense of bondholders, or vice versa, but that is not relevant here.[8] It is also important that our profitability measure be unaffected by shifts in capital structure over time.

Of course, not all NFC securities are publicly traded. Even for securities that are, price data are not always conveniently available. (This is the case for most corporate bonds, for example.) Therefore it was necessary to work out a procedure for estimating MV_t[9] and R_t. Of course alternative procedures are possible, but we believe any careful estimates will show the same patterns across time.

Table 1 shows real and nominal R_t s for various one- and five-year intervals between 1929 and 1976. The R_t s are extremely volatile when measured annually, as Panel A shows. However, hindsight reveals a pattern.[10] Investors

Table 1

AVERAGE RATES OF RETURN EARNED BY INVESTORS IN NON-FINANCIAL CORPORATIONS, 1929-76

A. Annual Returns (Percent)

Year	Nominal Return	Real Return	Year	Nominal Return	Real Return
1929	-6.6	-6.8	1953	-.1	-0.7
1930	-18.8	-12.8	1954	42.5	43.0
1931	-32.2	-22.7	1955	24.8	24.4
1932	-4.4	5.9	1956	4.5	1.6
1933	35.4	34.9	1957	-7.8	-10.8
1934	4.0	2.0	1958	35.4	33.6
1935	32.7	29.7	1959	9.8	8.3
1936	25.1	23.9	1960	1.8	0.3
1937	-23.5	-26.6	1961	22.9	22.2
1938	21.8	24.6	1962	-6.0	-7.2
1939	1.1	1.6	1963	18.5	16.9
1940	-5.4	-6.4	1964	14.4	13.2
1941	-6.4	-16.1	1965	10.2	8.3
1942	13.4	4.1	1966	-8.3	-11.7
1943	18.4	15.2	1967	17.8	14.8
1944	15.5	13.4	1968	9.5	4.8
1945	27.4	25.1	1969	-8.4	-14.5
1946	-6.5	-24.7	1970	7.1	1.6
1947	4.4	-4.6	1971	13.4	10.0
1948	5.3	2.6	1972	15.9	12.5
1949	16.3	18.1	1973	-10.9	-19.7
1950	25.0	19.2	1974	-19.3	-32.1
1951	19.1	13.2	1975	28.6	21.6
1952	15.5	14.6	1976	22.1	17.3

B. Average Returns (Percent)

Period	Return	Real Return
1929-35	1.4	4.3
1936-40	3.8	3.4
1941-45	13.7	8.3
1946-50	8.9	2.1
1951-55	20.4	18.9
1956-60	8.7	6.6
1961-65	12.0	10.7
1966-70	3.5	-1.0
1971-76	8.3	1.6

Table 1 (continued)

Sources

1. Annual returns are weighted averages of rates of return on debt and equity held from the beginning to the end of the year.

   The equity rate of return is the annual rate of return, including both dividends and capital gains, on the Standard and Poor's Composite Index, as reported in R. Ibbotsen and R. Sinquefield, [14], Exhibit A-1, pp. 72-73.

   The debt return is the rate of return on a portfolio of long-term corporate bonds constructed by Ibbotsen and Sinquefield. The returns are reported by Ibbotsen and Sinquefield in their
   Unfortunately the maturity of this portfolio probably overstates the average maturity of NFC debt. Consequently, the mean and volatility of our estimate of $R_t(D)$ are overstatements of the true mean and volatility. Ibbotsen and Sinquefield found that both mean return and volatility have increased with bond maturity. See Exhibit A-3, pp. 76-77.

   The portfolio weights are the proportional contributions of debt and equity to the total estimated market value of all nonfinancial corporations. See Appendix Table A1.

2. Real returns are found by subtracting percentage changes in the consumer price index, as reported by Ibbotsen and Sinquefield, Exhibit A-5, pp. 80-81.

3. The returns in Panel B are simple averages of the returns in Panel A. Note that the period 1929-35 actually contains seven years, and that the period 1971-76 contains six years.

in NFC securities fared very well indeed after World War II and up to about 1965, but poorly after that. The contrast between the first and second halves of the 1960s is dramatic, particularly when real rates of return are examined. The poor performance of the late 1960s continues in the first half of the 1970s. Panel B of Table 1 shows that non-financial corporations have earned, on average, a negative real rate of return from 1966 to 1970. Also, note that real rates of return were worse in 1973-74 than in 1930-31.

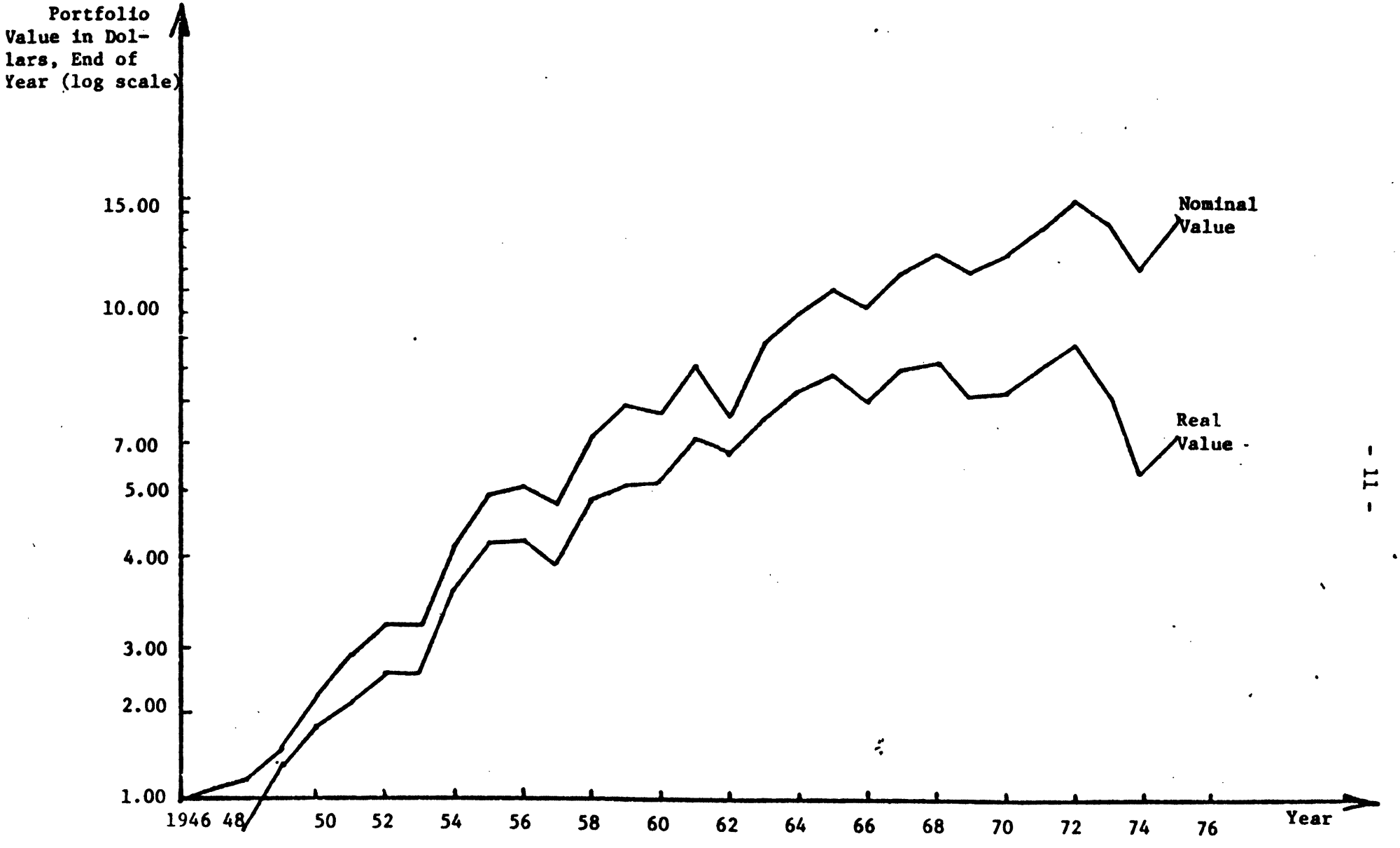
Figure 1 displays the returns in a different way. Suppose that at the start of 1947 you had invested $1.00 in the portfolio of all bonds and stocks issued by NFCs. That is, you started by owning a very small fraction of the portfolio of all NFC securities, which in aggregate was worth MV_{1947}. You then followed a buy-and-hold strategy, reinvesting all dividends and interest. The rate of growth in that investment's value indicates how well or poorly NFCs have fared.

Of course Figure 1 tells the same story as Table 1, but it is told in a way that may be easier to appreciate. Both nominal and real values increased rapidly, with few interruptions, up to about 1965. After that there was slower and more erratic growth in the portfolio's nominal value. Its real value has grown hardly at all since 1965.

Aggregate Market Value of NFC Securities

Most of the volatility of the rates of return reflect capital gains or losses: that is, changes in MV_t, the aggregate market value of NFC securities. We are also concerned with the level of MV_t. Of course we expect MV_t to increase over time as corporations grow. Therefore we express MV_t relative to CS_t,

Figure 1: VALUE OF PORTFOLIO OF NFC SECURITIES -- BUY AND HOLD INVESTMENT STRATEGY



Source: Table 1

the net replacement cost of NFC depreciable capital and inventory, expressed in current dollars.[11/] This adjusts for that part of the movement in MV_t caused by inflation and expansion in the scale of NFC operations.

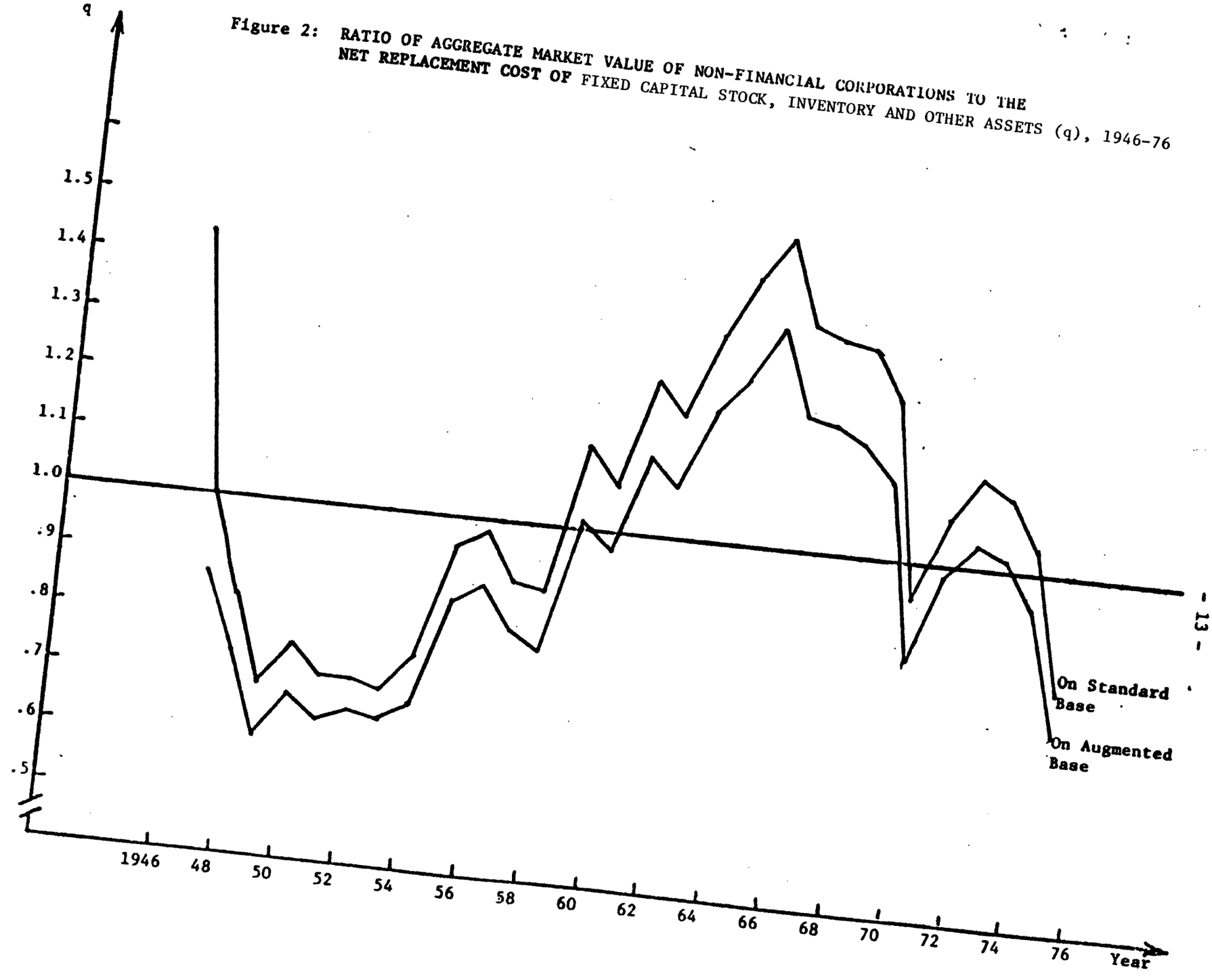
The ratio of market value to net replacement cost of plant, equipment and inventory is usually referred to as "Tobin's q."[12/] This ratio is plotted in Figure 2 for 1946-76.

A value of q = 1.0 means that the market value of the earnings stream generated by NFC assets is exactly equal to the net replacement cost of those assets. This is the value for q we expect to observe <u>if</u> the economy is in long-run equilibrium, <u>if</u> the definition of CS_t includes all income-producing assets, and <u>if</u> MV_t and CS_t are measured without error. Recognizing these ifs, we should not read too much significance into the absolute value of q. It is nevertheless odd to find q so far below 1.0 in the early postwar period. If the estimates are anywhere near correct, it was far cheaper for firms to add capacity by purchasing other firms, than by buying fresh plant, equipment and inventory. In 1953, for example, it was possible to purchase an "average firm" for only 70 percent of the net replacement cost of its assets.

The year 1965 was the turning point for q. Since then it has followed an erratic downward course to its current value below 1.0. Note, however, that q remains above the levels characteristic of the early postwar period. In fact, the high rates of return earned by investors in NFC securities over the 1946-55 period can be largely attributed to the recovery of q to more "reasonable" levels.

The bottom line in Figure 2 shows q computed on an "augmented" capital base. The augmented base includes not only inventory and real capital but also estimates of the other assets held by NFCs, such as land, cash and accounts receivable,

Figure 2: RATIO OF AGGREGATE MARKET VALUE OF NON-FINANCIAL CORPORATIONS TO THE NET REPLACEMENT COST OF FIXED CAPITAL STOCK, INVENTORY AND OTHER ASSETS (q), 1946-76



etc. The estimation and significance of the augmented base are discussed in Section III and in the Appendix. At this point we merely note that the choice of the base used in calculating q does not affect its pattern over time.

Numerical values for the standard and augmented q are given in Table 2 for 1929-76. There is one major surprise in the prewar data. q was higher in 1936 than it has been at any time since! Its average level from 1934-39 compares favorably with the best years of the 1960s. The immediate reason is the actual shrinkage of the net replacement cost of capital stock in the 1930s, (see Appendix Table A2a) combined with the recovery in market value beginning in 1934 (see Table A1). We have not identified a deeper reason. But the apparent magnitude of q warns against the characterization of all of the 1930s as a bleak time for all U.S. corporations.

Interpreting q

Despite its interest and usefulness, q is easy to misinterpret. Of course, there are problems of aggregation: the q for all NFCs hides substantial interindustry and interfirm variation. There are also difficult problems of measurement and definition.

Consider, for example, the following statement from the 1977 Economic Report of the President:[13/]

> If . . . assets are valued in the market significantly above their replacement cost, corporations will be encouraged to invest in new equipment and thereby create capital gains for the owners of their securities.

Properly interpreted this statement is correct, but it is nevertheless ambiguous if taken literally.

Table 2

RATIO OF AGGREGATE MARKET VALUE OF NON-FINANCIAL CORPORATIONS TO NET REPLACEMENT COST OF PLANT AND EQUIPMENT, INVENTORIES AND OTHER ASSETS, 1929-76

Year	q (Standard)	q (Augmented)	Year	q (Standard)	q (Augmented)
1929	1.93		1953	.70	.65
1930	1.69		1954	.76	.68
1931	1.09		1955	.95	.86
1932	.57		1956	.98	.89
1933	1.14		1957	.90	.82
1934	1.46		1958	.89	.79
1935	1.44		1959	1.12	1.01
1936	2.34		1960	1.08	.97
1937	1.95		1961	1.26	1.13
1938	1.06		1962	1.21	1.09
1939	1.53		1963	1.35	1.22
1940	1.27		1964	1.45	1.28
1941	1.10		1965	1.52	1.37
1942	.89		1966	1.38	1.23
1943	1.19		1967	1.36	1.22
1944	1.19		1968	1.35	1.19
1945	1.31		1969	1.27	1.13
1946	1.44		1970	.94	.84
1947	1.00	.87	1971	1.08	.98
1948	.84	.74	1972	1.15	1.03
1949	.68	.60	1973	1.12	1.00
1950	.76	.68	1974	1.04	.93
1951	.70	.64	1975	.81	.72
1952	.70	.66	1976	.88	.79

Sources:

1. The standard q is the ratio of the total market value of non-financial corporations (from Table A1) to their net plant, equipment and inventories (Table A2a, Column 5).

2. The augmented q differs only in its denominator. Market value is divided by total non-financial assets of non-financial corporations (Table A3, Column 7).

   Data for calculating the augmented base were unavailable for years prior to 1947.

Consider how the level of an individual firm's q affects the firm's rate of investment. Figure 3a portrays the investment decision: the firm invests to increase capacity until V, the present value of forecasted net cash flows generated by an additional machine, declines to C, the cost per machine. Since all but the last machine have positive net present values, $(V - C > 0)$, the firm's q exceeds one. But the net present value of the marginal machine is zero. That is, the marginal q equals exactly 1.0. The quotation cited could be misinterpreted as a prediction that firms will continue investing so long as the average q (which is what we observe) is greater than one.

It is true that both the average and the marginal q equal one in a long-run equilibrium. If all industries are competitive, and if the denominator of q correctly measures the value of all assets, including intangible ones, then any opportunities to make investments having positive net present values must last only for the short-run. In this sense it is true to say that a q greater than one for some firms implies profitable investment opportunities for others.

On the other hand, an entrenched, profit-maximizing monopolist would have a continuing supply of positive net present value investments, and therefore would have a q greater than one even in long-run equilibrium. But not every firm with a high measured q is a monopolist: intangible assets, such as value created by expenditures on research and development, are reflected in the numerator but not the denominator of q. The observed q for such firms is overstated.[14/]

The quotation we cited would be unambiguously correct if it referred not to the level of q, but to a rise in that level. An increase in q should predict an increase in the rate of investment. Consider a firm starting at the

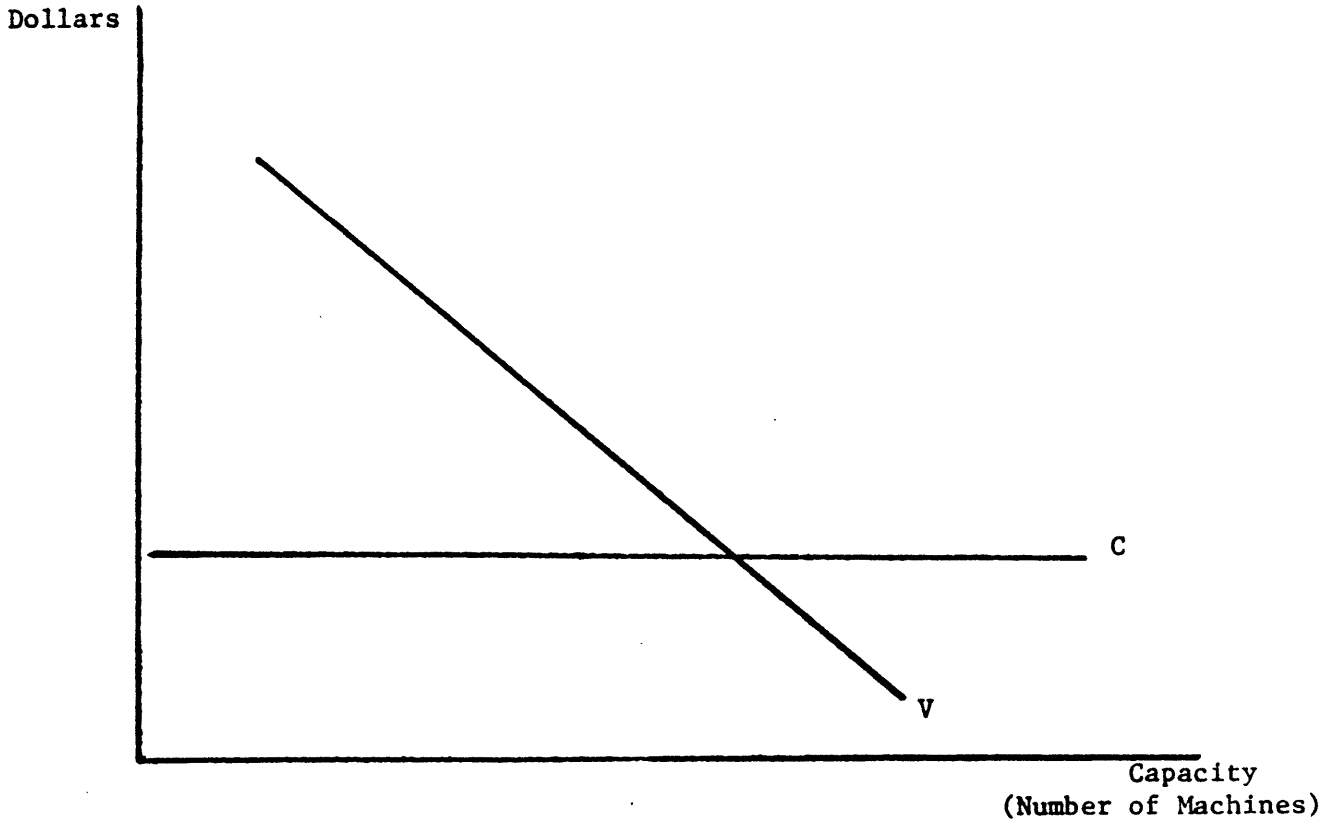


Fig. 3_a. The Firm's
Investment Decision

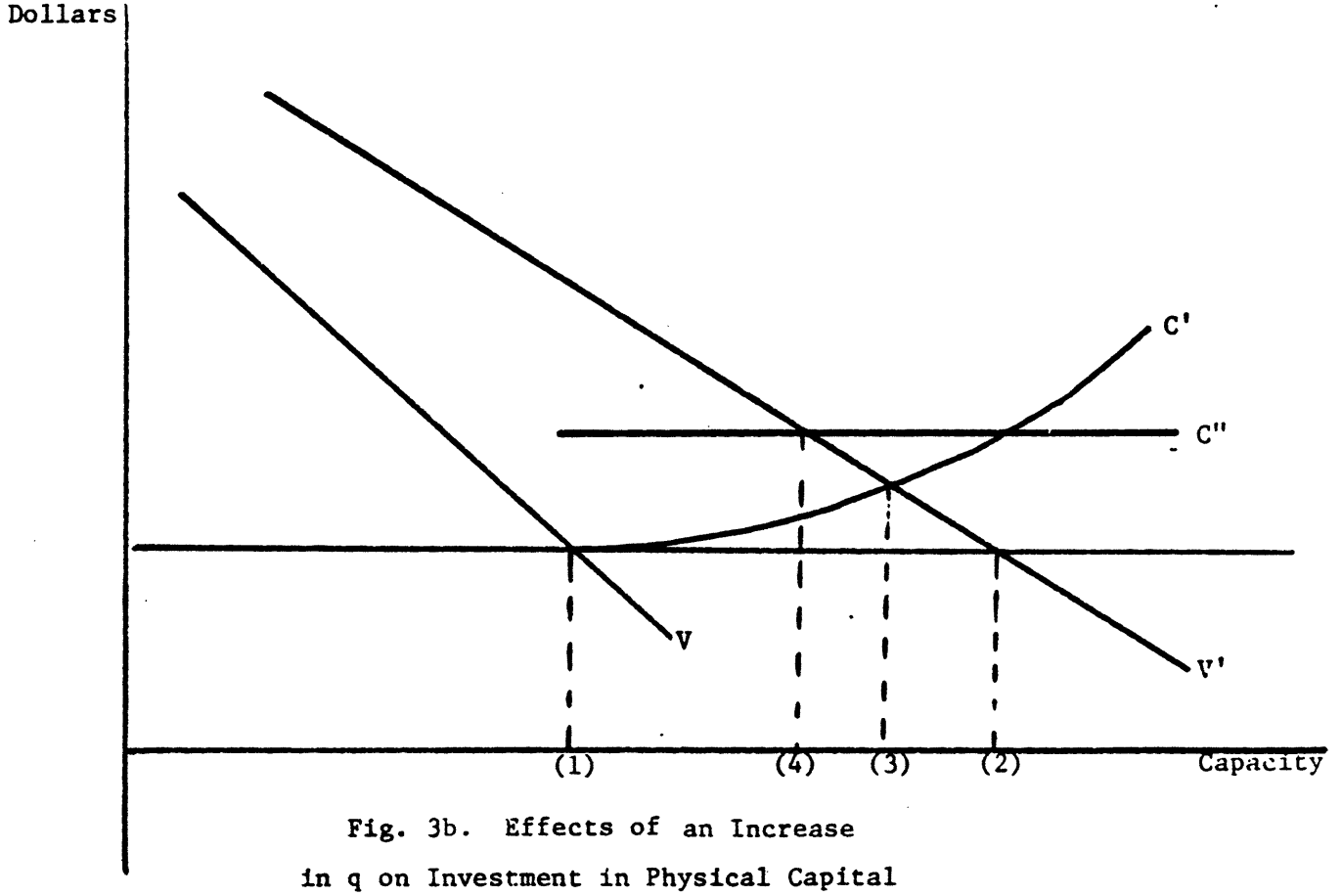


Fig. 3b. Effects of an Increase
in q on Investment in Physical Capital

optimal capacity level as determined by V = C. In Figure 3b, the investment opportunity schedule shifts up to V', thus increasing q. Investment increases in response, lifting capacity to a new equilibrium above the initial level 1 .

The actual adjustment might occur in a number of ways. If C, the cost per machine, is constant, the firm moves directly to 2 , perhaps with a delay. It is perhaps more realistic to assume that the firm faces an upward-sloping cost curve C' in the short run, with the steepness of the curve depending on the speed of adjustment. Still another possibility is that producers of machines will, at least in the short run, capture some of the excess profits created by the upward shift in V. This gives a cost curve C" and the equilibrium position 4 .

But we can say the following regardless of the adjustment mechanism: because q reflects the expected profitability of corporate investment relative to the opportunity cost of capital, an increase in q should signal increased corporate investment.[15/]

We have assumed in all of this that the denominator would always be determined by the initial cost level C. The adjustment costs in C' would not be picked up in capital stock as measured in the National Income Accounts, although one could argue that they should be. For example, if firms face adjustment costs, then the true secondhand value of all machines at the time of Figure 3b is not C, but C' at capacity level 3. Nor would the National Income Accounts pick up a short run increase in costs to C". The denominator as we measure it has to be thought of as a long run net replacement cost, given current prices and technology. It probably does not adequately reflect year-to-year changes in the marginal cost of adding new capacity.

Conclusions

The first 20 postwar years were a generally favorable period for NFCs. Investors in NFC securities earned average rates of return on market value that seem, in hindsight, to be unusually generous. In 1946 the aggregate market value of NFC stocks and bonds was roughly 1 1/2 times net replacement cost of NFC inventory and capital stock. But for the next 12 years the aggregate market value of NFC securities was below the net replacement cost of physical assets held by NFCs. A sharp relative rise in market value started in 1959. By 1965, aggregate market value was 50 percent larger than a greatly expanded base of inventory and real assets.

There was a dramatic reversal of fortune in the next decade. Real rates of return to investors were low and often negative. Aggregate market value fell to a level below the inventory and real asset base.

Of course we do not know why all this happened. Values observed in capital markets show us only the end result of a complicated process. Insights into earlier stages of the process must come from other measures of profitability.

III. RATES OF RETURN ON CAPITAL STOCK

In this section we examine NFC profitability from a different point of view. In Section II we derived estimates of income and value from capital market data. The estimates in this section are based on annual measures of asset value and operating income developed by the Bureau of Economic Analysis of the Department of Commerce as part of the National Income and Product Accounts (NIPA). In effect we are moving from capital market measures of return to measures closer to the book or accounting measures utilized by business firms.

The capital market measures are sufficient to tell us how well NFCs have fared, but they give no clue to the reasons for good or bad performance. For example, we have no way of inferring from market value data whether the period of unusually high market values in the mid-1960 s was due to high operating profits, to low capitalization rates for NFC securities, or to a combination of both. The interpretation of capital market data requires information from other sources.

Many measures of rate of return can be derived from NIPA data. The one we emphasize most is the rate of return on capital stock (ROC), defined as the ratio of NFC operating income, i.e., profits plus interest, to the net replacement cost of NFC depreciable capital stock and inventories. Our estimates are based on newly revised series prepared by the Bureau of Economic Analysis.[16/]

Following other investigators, we interpret ROC as the real rate of return on NFC capital stock. Of course, such an interpretation rests on a number of assumptions, some of which are not strictly true. Firms must

invest in other assets besides inventories and plant and equipment, for example. (Later in this section we examine ROC computed on an "augmented" investment base.) Also, operating income equals real income only if there are no real holding gains on capital stock and inventories: that is, only if the reproduction costs of capital stock and inventories rise at exactly the same rate as prices generally. (Again, later in this section, we adjust ROC for holding gains or losses.)

Nevertheless, operating income is an important indicator of corporate performance and a decent first approximation of real operating income. Moreover, our conclusions are insensitive to the exact definition of income or ROC.

Before-Tax Rates of Return

The first column of Table 3 presents before-tax ROCs for the NFC sector for the period 1929-76. Annual data are in Part A and five-year averages in Part B. ROCs for the postwar period are plotted in Figure 4.

Three distinct periods can be noted in the postwar results. From 1946 through 1960, the before-tax ROC tended to decline, but with sharp year-to-year fluctuations. It averaged 13.0 percent. There was an upward burst of profitability in the first half of the 1960s and a decline in the second half. The average for the period 1961-70 was 13.3 percent. Finally for the short period 1971-76, ROC averaged 9.4 percent, noticeably lower than the other two periods.

The same pattern over time is evident in the five-year averages in Part B. We have a cyclical series in which most recent years run well below the

Table 3

RATES OF RETURN ON THE NET REPLACEMENT COST OF CAPITAL STOCK AND INVENTORIES OF NON-FINANCIAL CORPORATIONS, 1929-76

A. Annual Returns (Percent)

Year	Before-Tax Rate of Return[1]	After-Tax Rate of Return[2]
1929	9.8	8.5
1930	7.7	6.9
1931	3.7	3.1
1932	-0.2	-0.7
1933	-0.4	-1.2
1934	3.6	2.2
1935	5.3	3.9
1936	8.0	5.8
1937	8.5	6.6
1938	5.6	4.4
1939	7.9	6.0
1940	11.6	8.1
1941	16.2	7.7
1942	20.2	8.4
1943	20.5	9.4
1944	22.9	10.2
1945	17.9	7.9
1946	12.5	5.2
1947	14.1	6.8
1948	15.6	8.6
1949	13.3	8.1
1950	15.7	7.0
1951	15.8	6.1
1952	13.3	5.8
1953	12.4	5.1
1954	11.6	5.6
1955	14.4	7.1
1956	12.4	5.8
1957	11.3	5.5
1958	9.6	4.9
1959	12.1	6.3
1960	11.2	5.9
1961	11.1	5.8
1962	12.8	7.5
1963	13.6	8.0
1964	14.7	9.0
1965	16.0	9.9

Table 3 (continued)

1966	15.8	9.9
1967	13.9	8.8
1968	13.6	8.1
1969	12.0	7.0
1970	9.4	5.7
1971	9.7	5.9
1972	10.8	6.8
1973	10.4	6.3
1974[3]	7.8	4.1
1975[3]	8.2	5.0
1976[3]	9.6	5.6

Part B - Five-Year Averages

Years	Before-Tax Rate of Return (Percent)	After-Tax Rate of Return (Percent)
1929-35	4.2	3.2
1936-40	8.3	6,2
1941-45	19.6	8.7
1946-50	14.2	7.1
1951-55	13.5	5.9
1956-60	11.3	5.7
1961-65	13.6	8.0
1966-70	12.9	7.9
1971-76[3]	9.4	5.6

Sources:

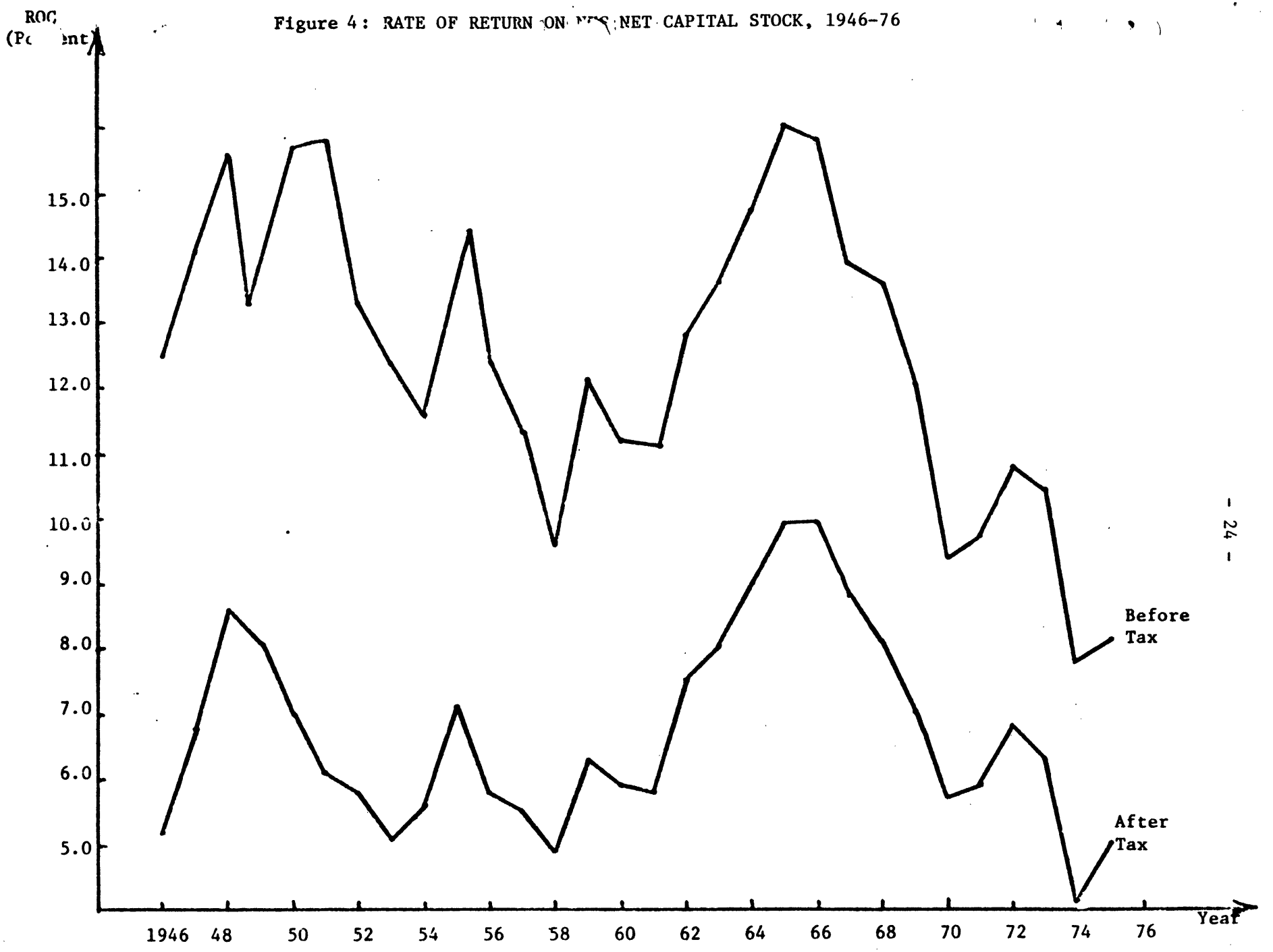
1. The before-tax rate of return is the ratio of (1) before tax operating income of non-financial corporations, to (2) the net replacement cost of non-financial corporations' inventory and capital equipment. Item (1) is calculated after straight-line depreciation on the net replacement cost of capital equipment, assuming asset life is 85 percent of lives published in the Department of Commerce's Bulletin F. Item (1) is before interest and does not include inventory profits. Item (2) is the average of inventory and fixed capital equipment values as estimated at the start and end of the calendar year. From 1958 on the inventory figure is the June quarter value in each year. See Tables A2a and A4a.

2. The after-tax rate of return is the before-tax figure, minus corporate income taxes. See Table A4a.

3. NIPA estimates are usually revised several times. New figures for 1974-76 were published after this study was completed. (Survey of Current Business, July, 1977). But as the following comparison shows, the changes do not affect our conclusions.

Year	After-Tax ROC (Percent)	
	This Study	July, 1977 Revision
1974	4.1	4.1
1975	5.0	5.4
1976	5.6	5.8
Average for 1971-1976	5.6	5.7

Figure 4: RATE OF RETURN ON NET CAPITAL STOCK, 1946-76



Source: Table 3

average of the rest of the postwar period.

Was the decline from the peak of the mid-1960s so sharp as to carry the before-tax ROC to a new low level? It appears so. But this result cannot be vigorously defended. It is based on a short run of years, and may be a transitory or cyclical phenomenon. Later in this section we make a more careful attempt to extract the trend, if there is any, from the before-tax ROCs.

After-Tax Rates of Return

Figure 4 and Table 3 also present after-tax ROCs. The after-tax ROC differs from its before-tax counterpart only in that corporate income taxes are subtracted from operating income.

It is after-tax income that counts in the determination of security prices. The after-tax ROC is the "book" counterpart to R, the market rate of return on all NFC securities.

The after-tax ROC is perhaps more pertinent than its before-tax counterpart as evidence in the current debate on profitability. It measures the actual reward to suppliers of capital, or, as some view it, the amount available to finance new investment. Has the after-tax ROC tended to decline?

The three episodes observed for the before-tax ROC also characterize the after-tax figure. There were wide fluctuations around a mean of 6.3 percent from 1946-1960, then a sharp rise and fall in the 1960's, averaging 8.0 percent. The average was only 5.6 percent for the period 1971-76.[17/]

The low after-tax ROCs for the most recent half dozen years are not unique, however. The five-year averages for each half of the 1950s ran at equally low levels (see part B of Table 3).

The most unusual aspect of Table 3 and Figure 4 are the high rates of return over most of the 1960s.

The historical record, then, does not appear to support the view that recent after-tax ROCs have been unprecedentedly low. In this respect there seems to be a difference between before- and after-tax ROC. The difference is pointed up by the five-year averages in Table 3. We have already noted the essential similarity in level of the after-tax ROCs averaged for the 1950s and for the most recent years. The before-tax ROC, however, was considerably higher in the 1950s than in the 1970s.

Later in the paper we undertake a more careful analysis of trends in the before- and after-tax ROCs.

NFC Income Taxes

The narrowing spread between before-and-after tax ROC's since the end of the War is due to a downward drift in effective corporate tax rates. Although legislated rates of the Federal Corporation income tax (by far the largest component of NFC income tax liability) were substantially the same from 1951 through 1976 (see the first column of Table 4) and state corporation income tax rates moved up over these years, the effective tax rate on NFC operating income has tended to decline (column 2 of Table 4). Effective rates started to move down in the early 1960s, and the decline has tended to persist, although not without interruption.

Some of the decline in effective rates is due to purposeful government

Table 4

EFFECTIVE TAX RATES ON OPERATING INCOME
OF NON-FINANCIAL CORPORATIONS 1946-1976

Year	Marginal Tax Rate	Effective Tax Rate	Tax Shield on Debt Interest as a Fraction of Before Tax Operating Income	Hypothetical All Equity Tax Rate
1946	38	58.1	3.4	61.5
1947	38	52.1	2.9	55.0
1948	38	44.2	2.2	46.4
1949	38	38.7	2.9	41.6
1950	42	55.4	2.6	58.0
1951	50.75	61.5	3.2	64.7
1952	52	56.5	3.8	60.3
1953	52	59.3	4.5	63.8
1954	52	51.7	5.0	56.7
1955	52	50.8	4.0	54.0
1956	52	53.2	4.5	57.7
1957	52	51.3	5.6	56.9
1958	52	49.4	7.0	56.4
1959	52	48.4	5.8	54.2
1960	52	46.9	6.8	53.7
1961	52	47.2	7.3	54.5
1962	52	41.7	6.9	48.6
1963	52	41.6	6.6	48.2
1964	50	38.7	6.3	45.0
1965	48	37.6	5.7	43.3
1966	48	37.5	6.2	43.7
1967	48	36.5	7.5	44.0
1968	52.8	40.9	8.8	49.7
1969	52.8	41.9	11.7	53.6
1970	49.2	39.8	15.7	55.5
1971	48	39.0	14.2	53.2
1972	48	36.8	12.8	49.6
1973	48	40.0	14.3	54.3
1974	48	48.1	19.8	67.9
1975	48	38.4	17.8	56.2
1976	48	41.0	15.7	56.7

Table 4 (continued)

Sources: Table 3 and Survey of Current Business, various issues. Marginal tax rates taken from Pechman [24], p. 259.

Note: In computing the Tax Shield we multiplied the sum of Net Interest (column 3 of Table A4a) and imputed interest received by Nonfinancial Corporate Business (line 39 of Table 8.2 in the National Income and Product Accounts of the United States, 1929-74, Statistical Tables and the Survey of Current Business, July, 1977) by the marginal rate of corporate income tax. Adding back imputed interest received gave us the total of net monetary interest which is the relevant total for the size of the debt shield: We are grateful to Eugene Fama and Nicholas Gonedes for this clarification. However, the net interest component of operating income as it appears in the numerator of our ROC calculation is properly the net interest entry in Table A4a.

Our estimate tends to overstate the debt shield and its effect in moderating effective rates of corporate tax to the extent that rates lower than the marginal rate of corporate tax would have applied had interest been taxable.

policies, for example the introduction of accelerated depreciation, the tendency to shorten depreciable lives for tax purposes, and permitting LIFO inventory accounting for tax purposes, and the investment tax credit. But the major part of the decline of effective rates in recent years reflects NFC financing policy and rising nominal interest rates.

The third column of Table 4 shows the growing importance of the interest tax shield, and the role it plays in maintaining the after-tax profitability of corporations. We are now at the point where the deductibility of interest charges from taxable income reduces the effective tax rate on operating income by 15 to 20 percentage points!

The final column of Table 4 suggests what the effective rate of corporate tax would have been in the absence of the tax shield provided by the NFC debt, but with everything else unchanged. There is no discernable downward drift in this hypothetical all-equity tax rate. This suggests that the tax incentives introduced over the postwar period served generally to keep the corporate income tax levied on nominal income from becoming in increasing

burden on real operating income, while the growing importance of the debt shield acted to lower the effective rate on real operating income. Only for the stretch of years from 1962 through 1966, when the debt interest shield was a constant fraction of real operating income and the effective rate fell, can it be concluded that the tax incentives were sufficiently powerful to outweigh the upward pressure on effective rates created by taxation of nominal capital gains on inventory and plant and equipment. Herein lies one strand of the explantion for the rise of profitability in the early 1960s. Price stability over this period kept nominal holding gains low, thus permitting the tax incentives to show up in lower effective rates of tax on real income.

Although the effective tax rate has drifted downward in the postwar period, that trend is only part of the story. Bursts of inflation have sent corporate income tax liabilities up and after-tax profitability down. The results for 1974 are particularly dramatic. Hankin has found a significant negative correlation in the post-war period between the after-tax ROC and the rate of inflation, after adjustment for a time trend and the rate of change in GNP. There was a strong positive link between inflation and the effective tax rate, but no significant association between inflation and before-tax ROC. 18/

Alternative Measures

Although we believe the estimates of ROC presented above will be widely accepted as reasonable and pertinent measures of profitability, many other measures are possible. Even with the same underlying data base, alternative assumptions about depreciation patterns and service lives give different estimates of ROC. Also, different or expanded data bases could be employed. A definitive case cannot be made in favor of the particular coverage and assumptions on which Table 3 is based. Therefore we examined a number of additional ROC estimates to check that the patterns we have found persist under alternative definitions.

Different depreciation patterns and service lives. In deriving Table 3 we used the standard NIPA estimates of capital stock and depreciation in current dollars. These estimates assume straight-line depreciation and service lives equal to 85 percent of those given in the Internal Revenue Service's Bulletin F.

The NIPA data base can be used to develop a number of alternative estimates. From this set we have chosen three. One assumes a different time pattern of depreciation -- double-declining balance. For another, different service lives are postulated -- 100 percent of Bulletin F up to 1940, a gradual decline to 75 percent from 1940 to 1960, and continuing at 75 percent from 1960 on. And for the third, "historical" values and costs are used.

These changes in underlying assumptions result in very different levels for operating income and capital stock. For example, for mid-year 1970,

the current net value of NFC plant and equipment is $540 billion under the standard NIPA assumption; with double-declining balance depreciation it is $446 billion. Likewise in that year, the numerator in the after-tax ROC calculation -- after-tax profit plus interest -- is $41.3 billion in the "standard" case, and $36.6 billion with double declining balance depreciation. These dramatic differences do not carry through to the ROC, however. First, the denominator of the ROC calculation includes inventories as well as depreciable capital. Inventory is the same under all alternatives, so the denominators do not differ as much as the depreciable asset estimates taken alone. Second, differences in both numerator and denominator are in the same direction and tend to offset. The ROCs as calculated, therefore, differ only slightly -- 5.7 percent for the standard case vs. 5.8 percent with double-declining balance depreciation. ROCs both before and after tax under the standard case and two alternative sets of assumptions appear in the first three columns of Table 5.[19/]

Clearly, the general pattern of ROC behavior over time for the standard case also characterizes the series for double declining balance depreciation and changing depreciable lives. Double declining balance gives ROCs slightly higher than "standard," changing depreciable lives slightly lower. But all three have the same general configuration over time.

Among them these three encompass the range of all reasonable possibilities. The standard case comes out in about the middle.

Historical Cost Accounting. The ROC measures given in the fourth column of Table 5 are intended to approximate NFC profitability as

Table 5

ALTERNATIVE ESTIMATES OF RATES OF RETURN
ON NET INVESTMENT IN PLANT, EQUIPMENT, AND
INVENTORIES OF NON-FINANCIAL CORPORATIONS, 1946-72

Part A: Before-Tax ROC (percent)

Year	Standard Assumptions	Double-Declining Balance	Changing Depreciable Lives	"Historical" Cost
1946	12.5	14.2	11.1	23.5
1947	14.1	15.7	12.6	26.1
1948	15.6	17.2	14.1	24.7
1949	13.3	14.5	11.9	18.1
1950	15.7	17.3	14.1	25.5
1951	15.8	17.4	14.3	23.2
1952	13.3	14.6	12.0	18.4
1953	12.4	13.7	11.3	18.0
1954	11.6	12.8	10.6	16.2
1955	14.4	16.1	13.2	20.1
1956	12.4	13.7	11.3	18.4
1957	11.3	12.3	10.2	16.5
1958	9.6	10.5	8.6	13.8
1959	12.1	13.5	11.0	19.3
1960	11.2	12.5	10.2	14.9
1961	11.1	12.5	10.1	14.2
1962	12.8	14.4	11.7	15.7
1963	13.6	15.4	12.7	15.2
1964	14.7	16.5	13.8	16.8
1965	16.0	17.8	15.1	18.8
1966	15.8	17.5	15.1	18.7
1967	13.9	15.1	13.3	16.7
1968	13.6	14.9	13.2	17.2
1969	12.0	13.0	11.5	16.0
1970	9.4	10.1	9.0	13.4
1971	9.7	10.6	9.4	14.0
1972	10.8	11.8	10.5	15.5

Table 5 (continued)

Part B: After Tax ROC (percent)

Year	Standard Assumptions	Double Declining Balance	Changing Depreciable Lives	"Historical" Cost	After Personal and Corporate Income Taxes
1946	5.2	5.8	4.6	14.4	4.2
1947	6.8	7.2	6.0	16.5	5.7
1948	8.6	9.3	7.8	15.7	8.0
1949	8.1	8.6	7.3	11.5	7.5
1950	7.0	7.4	6.3	14.5	6.2
1951	6.1	6.4	5.4	11.0	5.3
1952	5.8	6.1	5.2	9.0	4.9
1953	5.1	5.2	4.5	8.9	4.3
1954	5.6	5.9	5.0	8.9	4.8
1955	7.1	7.7	6.4	11.3	6.3
1956	5.8	6.1	5.1	10.3	5.0
1957	5.5	5.7	4.8	9.5	4.7
1958	4.9	5.0	4.2	8.1	4.1
1959	6.3	6.8	5.5	9.6	5.4
1960	5.9	6.4	5.1	8.8	5.1
1961	5.8	6.4	5.1	8.2	4.9
1962	7.5	8.2	6.6	9.7	6.5
1963	8.0	8.8	7.1	10.0	6.9
1964	9.0	10.0	8.2	11.0	8.0
1965	9.9	10.9	9.2	12.3	8.9
1966	9.9	10.7	9.2	12.2	8.8
1967	8.8	9.3	8.2	11.1	7.7
1968	8.1	8.5	7.6	10.9	6.9
1969	7.0	7.2	6.4	10.3	5.7
1970	5.7	5.8	5.2	9.0	4.6
1971	5.9	6.2	5.5	9.5	4.9
1972	6.8	7.2	6.4	10.8	5.8
1973	6.3	n.a.	n.a.	n.a.	5.2
1974	4.1	n.a.	n.a.	n.a.	2.9
1975	5.0	n.a.	n.a.	n.a.	3.9

Table 5 (continued)

Sources:

Part A

Standard Assumptions are explained in notes for Table 3.

Double-declining balance differs from standard assumptions by estimating depreciation on a declining balance formula at twice the straight-line rates. See Tables A2b and A4b.

Changing Depreciable Lives differs from Standard Assumptions in employing a pattern of asset lives declining over time from 100 percent to 75 percent of Bulletin F lives, whereas the standard assumptions use a constant 85 percent of Bulletin F. See Tables A2c and A4c.

Historical Cost differs from Standard Assumptions in that it approximates book values rather than replacement costs. In particular, there is no Inventory Valuation Adjustment, and the capital stock is valued at cost when initially acquired, net of depreciation. See Tables A2c and A4d.

Part B

All the measures in Part II are net of corporate income taxes. In deriving ROCs After Personal and Corporate Income Taxes, an estimate of the federal income taxes paid by recipients of the dividends and net interest payments of NFCs is also subtracted.

We based our estimate of the Federal personal income tax on two empirical regularities:

1. From 1947-1974, total personal income tax liability was a rather constant fraction of total adjusted gross income -- typically 10-13 percent. (See Joseph A. Pechman, [24] p. 323 and 326 for underlying data.)

2. Over the period 1947-57, the weighted average effective rate of personal income tax on aggregate dividends (national income total) ran about twice as high as the rate on total adjusted gross income (See Daniel M. Holland, [13], p. 112 for relevant data.)

Therefore, for the period 1946-75 we assumed the effective rate on dividend receipts to be twice that on total adjusted gross income. (We took the 1947 rates to hold for 1946, and 1974 rates to apply in 1975.) Given that a large fraction of corporate bonds is held by non-taxable (or lightly taxed) intermediaries, the effective rate on interest should be lower than that on dividends, but higher than that on total adjusted gross income. We took the effective rate of tax on interest to be equal to that on adjusted gross income plus one half the difference between the dividend rate and that on adjusted gross income.

Table 5 (continued)

Further personal income tax could be paid in a later year on the realized capital gains due to the earnings retained in a given year. Our estimates take no account of this, but the distortion is likely to be quite small. A good fraction of corporate earnings "belong" to non-taxable owners, and most of potentially taxable capital gains do not appear to be taxed. See Bailey [2], p. 38.

it would be measured under currently accepted accounting conventions. This historical cost series includes inventory profits in income, measures depreciation on an historical cost basis, and uses the book value (that is, the historical cost of acquisition) of the capital stock. The numerator of the historical cost ROC calculation is overstated because inventory profits are included and depreciation is understated. The denominator is understated because the historical acquisition cost of capital stock is below the current cost of replacement. Thus the historical cost ROC overstates real profitability.

The historical cost ROC is not a reasonable measure of real return. Nor can anything of substance be inferred from its behavior over time. But it is interesting nevertheless, because it shows the rough magnitude of error in measuring NFC profitability from corporate accounts.[20/] Note, too, that the historical cost ROC comes closest to the figures often casually cited as normal rates of return on corporate investment--about 20 percent before tax and 10 percent after tax.

Effects of Personal Income Taxes. All the ROCs reported in Part B of Table 5 are defined after corporate income taxes. For the last column we have also subtracted an estimate of the personal income tax due from recipients of the net interest and dividends paid by NFCs. The estimating procedure, explained in the Notes to Table 5, simply approximates the additional tax. For our purposes it suffices, however. Although the after-tax ROC in the last column is, of course, lower, the pattern over time is similar to the pattern shown by other ROC measures.[21/]

Augmented Capital Stock. The ROC estimates presented thus far compare NFC operating income to the net reproduction cost of plant, equipment

and inventory. But business firms also hold stocks of cash and accounts receivable, and invest in land and various other assets. We estimated the aggregate value of these other items from the Treasury Department's Statistics of Income.[22/] Table 6 shows ROCs computed on this augmented base. These ROCs are uniformly lower than those presented in Table 3, because the capital base is increased. The ratio of the augmented to the standard base has no clear trend, however, so the pattern over time of the ROCs in Table 6 is about the same as in Table 3.[23/] The 1977 Economic Report of the President provides an augmented base estimated from a different source.[24/] For the period 1960-75, the after-tax ROC computed on our base runs about 10 percent lower than on this alternative base, but the pattern over time is the same.

Holding Gains on Capital Stock and Inventory. As we have pointed out, our measures of ROC include only operating income. That is, they exclude real holding gains, if any, on NFC capital stock and inventories. This is an accurate assumption if the net reproduction cost of capital stock and inventories increases at exactly the same rate as prices generally.[25/]

Of course holding gains and losses are automatically included in rates of return measured from capital market data. But they are more difficult to extract from the National Income and Product Accounts (NIPA). An approximation can be made if the NIPA figures for net replacement costs of capital stock and inventories are assumed to be reliable estimates of these assets' actual market values. Our procedure was as follows.

1. Net replacement cost of NFC capital stock is given both in current and constant dollars. The difference between the rate of increase of these two series is the rate of increase in the nominal value of a typical collection of the capital goods held by NFC's. That rate of increase was converted to real terms. (See Appendix Table A6.)

2. The Department of Commerce publishes an inventory valuation

Table 6

RATES OF RETURN ON AUGMENTED BASE FOR NON-FINANCIAL CORPORATIONS, 1947-75

Year	Before-Tax Rate of Return	After-Tax Rate of Return
1947	12.3	5.9
1948	13.7	7.7
1949	11.6	7.1
1950	13.8	6.1
1951	14.1	5.4
1952	12.3	5.3
1953	11.5	4.7
1954	10.5	5.1
1955	13.0	6.4
1956	11.3	5.3
1957	10.2	5.0
1958	8.6	4.3
1959	10.9	5.6
1960	10.1	5.4
1961	10.0	5.3
1962	11.5	6.7
1963	12.3	7.2
1964	13.0	8.0
1965	14.4	8.9
1966	14.1	8.8
1967	12.4	7.9
1968	12.1	7.2
1969	10.7	6.2
1970	8.5	5.1
1971	8.8	5.4
1972	9.6	5.4
1973	9.3	5.6
1974	7.0	3.6
1975	7.3	4.5
1976	8.5	5.0

Sources:

Calculated as in Table 3, except that the capital stock is defined as including all non-financial assets. The denominator was taken from Table A4, Column 7, rather than from Table A2.

adjustment (IVA) for NFCs. The IVA is an estimate of nominal holding gains on NFC inventories. We calculated annual estimates of the nominal holding gain that would be just sufficient to offset inflation. That figure is then subtracted from the corresponding year's IVA to obtain an estimated real holding gain (see Appendix Table A7).

The results are displayed in Table 7. Although the average holding gain for the entire 1946-76 period was quite small (only 0.3 percent), there were substantial gains and losses in particular periods.

ROCs with and without holding gains are compared in Figure 4. Including holding gains increases the volatility of the ROCs, expecially in the 1940s and 1950s. The volatility of the rates of return actually realized by investors was still greater however--compare Tables 1 and 7.

The decline in NFC profitability since the mid-1960s is less severe but still apparent when real holding gains are included in ROC. It becomes much more difficult to make sense of the 1946-65 period. We are not convinced that year-to-year fluctuations in real holding gains measured from the NIPA have much significance for the issues considered in this essay.[26/]

Summary. Our findings do not depend on a particular definition of income or capital stock. A picture substantially the same as that provided by our "standard" ROC measure emerges from a number of alternative measures as well. In discussing and interpreting our findings, therefore, we can

Table 7

ESTIMATED REAL HOLDING GAINS ON CAPITAL STOCK AND INVENTORIES OF NON-FINANCIAL CORPORATIONS, 1946-76

	Estimated Real Holding Gains				
Year	Capital Stock	Inventory	Total	Percent of Standard Base	After-Tax ROC with Holding Gains
1946	-4.0	-1.3	-5.3	-4.4	0.8
1947	3.2	1.7	4.9	3.3	10.1
1948	3.3	0.8	4.1	2.4	11.0
1949	2.2	-1.0	1.2	0.7	8.8
1950	4.2	1.8	6.0	3.1	10.1
1951	-4.6	-2.7	-7.3	-3.3	2.8
1952	7.8	-1.6	6.2	2.6	8.4
1953	1.3	0.6	1.9	0.8	5.9
1954	3.6	3.4	7.0	2.7	8.3
1955	9.3	1.4	10.7	3.9	11.0
1956	7.4	0.3	7.7	2.5	8.3
1957	.7	-1.1	-0.4	-0.1	5.4
1958	-1.0	-1.3	-2.3	-0.6	4.3
1959	-1.2	-0.9	-2.1	-0.6	5.7
1960	-3.7	-0.7	-4.4	-1.2	4.7
1961	-2.5	-0.8	-3.3	-0.9	4.9
1962	-2.8	-1.3	-4.1	-1.1	6.4
1963	-3.5	-1.6	-5.1	-1.3	6.7
1964	-.5	-1.0	-1.5	-0.4	8.6
1965	1.0	-0.4	0.6	0.1	10.0
1966	-.4	-2.5	-2.9	0.6	10.5
1967	2.8	-2.9	-0.1	0	8.8
1968	1.7	-4.5	-2.8	-0.4	7.7
1969	.4	-5.2	-5.8	-0.9	6.1
1970	1.3	-5.3	-4.0	-0.5	5.2
1971	6.8	-1.8	5.0	0.6	6.5
1972	8.9	-0.5	8.4	1.0	7.8
1973	5.7	-2.4	3.3	0.3	6.7
1974	12.5	1.8	14.3	1.3	5.4
1975	22.7	-11.1	11.6	0.9	5.9
1976	-19.4	-2.3	-21.7	-1.6	4.0

Sources:

Estimated real holding gains on capital stock and inventory are from Appendix Tables A5 and A6 respectively. These figures are totalled for each year and divided by the "standard base"--i.e., by the sum of average fixed capital stock and mid-year inventory in current dollars. See Appendix Table A2a.

concentrate on the standard case.

Comparing Alternative Profitability Measures

In Table 8 we list means and standard deviations for the ROC series developed in our study, and for R, the real rate of return earned by investors in NFCs. Comments on these alternative measures follow.

1. The standard after-tax ROC was 6.3 percent for 1929-[illegible]. It was virtually the same (6.7 percent) for the 30 years since the end of World War II. (See lines 1 and 2 in Table 8.)

2. Similarly, R, the real return earned by investors, averaged substantially the same for the post-war years as for the longer time period. (Lines 11 and 12.)

3. Morover, both measures of return are

of the same order of magnitude (Lines 1, 2, 4, 11, 12 and 13). It is comforting, but not surprising, to end up with this result. In the long run a congruence between the average returns on corporate securities and on corporate capital investment is to be expected. In shorter periods the two returns can be widely divergent, as the different standard deviations suggest.

4. The most appropriate series for comparison with R is the after-tax ROC for the Augmented Base (Lines 5 and 13). The important point is that the two series have averages of the same order of magnitude.

TABLE 8

Mean Values and Standard Deviations
For Selected Rates of Return Series
(percent per year)

		Mean (percent)	Standard Deviation of Series (Percent per year)
1.	ROC(AT): Standard Case, 1929-1976	6.34	2.33
2.	ROC(AT): Standard Case, 1946-1976	6.68	1.50
3.	ROC(AT): After Corporate and Personal Taxes, 1946-1975	5.77	1.51
4.	ROC(AT): Standard Case, 1947-1976	6.73	1.50
5.	ROC(AT): Augmented Base, 1947-1976	6.00	1.33
6.	ROC(AT): Standard Case, 1946-1972	6.90	1.46
7.	ROC(AT): Double-Declining Balance, 1946-1972	7.36	1.66
8.	ROC(AT): Changing Depreciable Lives, 1946-1972	6.22	1.40
9.	ROC(AT): "Historical Cost," 1946-1972	10.85	2.24
10.	ROC(AT): Standard Case with Holding Gains, 1946-1976	6.99	2.48
11.	Real Return Earned by Investors in NFC's, 1929-1976	5.94	17.26
12.	Real Return Earned by Investors in NFC's, 1946-1976	6.38	16.97
13.	Real Return Earned by Investors in NFC's, 1947-1976	7.36	15.92
14.	ROC(BT): Standard Case, 1929-1976	11.54	4.76
15.	ROC(BT): Standard Case, 1946-1976	12.41	2.30

5. The normal after-tax ROC appears to be between 6 and 7 percent--the range encompassed by all relevant measures (Lines 6, 7, 8 and 10).

6. It is particularly interesting to find virtually identical results for the standard base ROC whether or not real holding gains on corporate assets are included in earnings (Lines 2 and 10). Over the Post-War period these capital gains and losses have just about cancelled out. The ROC defined to include holding gains is, of course, a more volatile measure; the series has a larger standard deviation than the standard ROCs.

7. Prevailing accounting conventions provide seriously misleading evidence on real corporate profitability. The "historical cost" results averaged more than 4 percentage points higher than the correct results, i.e., they gave a rate of return that is 60 percent too high (Lines 6 and 9).

8. Over the past 30 years, the before-tax ROC averaged 12.4 percent. The difference between before and after-tax ROCs (Lines 15 and 2 of Table 8) reflects the effective corporate tax rate. On average, government received 46 percent of NFC operating income in corporate income taxes. However, the effective corporate tax rate has tended to decline in the period 1946-1976.

9. Additional taxes were levied on NFC operating income upon its distribution to individual claimants. Taking account of the personal income tax as well as the corporate income tax reduces the ROC by about one percentage point (Line 3), and indicates that government has taken the lion's share of operating income over the post-war period, 54 percent.

Searching for Trends

With respect to ROCs our study and several others follow the lines laid down in an earlier study by Nordhaus, who concluded that the ROC in the postwar period (1948-70) showed "a definite downtrend from 1948 to the middle 1950s a dramatic recovery from the late 1950s to the mid-1960s and a deterioration to a plateau by 1970." 27/ He interpreted this behavior as a postwar downtrend in corporate profitability, reflecting a steady decline in the opportunity cost of capital. 28/

This is not so clear to us. First, it is easier to see a declining trend if one starts with 1948, as did Nordhaus, rather than with 1946 which is our first postwar year. In 1948 ROC was at a cyclical peak well above the ROCs for 1946 and 1947. Second, the NIPA revisions, prepared after Nordhaus's study, reduce the ROC estimates for the period 1948-62, and increase them for the years after 1964. 29/ Finally, there may be different trends for before- and after-tax ROCs.

Inspection of Figure 4 leads us to doubt a secular downtrend in the postwar period for the after-tax ROC, and to suspect a declining trend for the before-tax ROC. But it would be difficult to see a downward drift (or lack thereof), if it existed, given the volatility and cyclicity of the ROC time series.

Therefore we have undertaken more elaborate statistical tests based on recent work by Hankin.[30/]

Lines 1 through 3 of Table 9 report the results of successively regressing the after-tax ROC on time, then on time and annual percentage changes in GNP, and finally on time, annual percentage changes in GNP, and the inflation rate.[31/] The change in GNP variable corrects for business cycle effects, and the rate of price change variable adjusts for inflation, correcting mainly for the impact of inflation on effective corporation income tax rates.

The first equation of Table 9 is the equivalent of a simple time trend. As a function of time alone, the after-tax ROC trended downward. But the coefficient is not significant. In the second equation, the ROC is related to time and the state of economic activity. The **latter emerges as a significant explanatory factor,** and **time becomes less important. The third equation adds the rate of inflation.** Inflation, too, turns out to be an **important and significant determinant. The more rapid the rate of inflation, other things equal, the lower the after-tax ROC. Inflation exercises its effect primarily through the effective tax rate.**

Note that in the third equation the time coefficient is positive.

TABLE 9

REGRESSION ANALYSIS OF AFTER-TAX ROC, 1946-76

	Variable				
Equation	Time	Level of Economic Activity[a]	Inflation[b]	Dummy[c]	R^2
(1)	-0.07 (-0.79)				0.58
(2)	-0.03 (-0.26)	0.15 (3.99)			0.73
(3)	+0.06 (0.79)	0.15 (4.43)	-0.16 (-3.10)		0.80
(4)	+0.13 (1.91)	0.15 (4.53)	-0.18 (-3.53)	-1.50 (-2.09)	0.83

Note: t statistics appear in parentheses under the coefficients. Values of 2 or more indicate significance.

[a] Annual percentage change in real GNP.

[b] Annual percentage change in Consumer Price Index.

[c] Equals zero for all years 1946-69, and one in each year from 1970 to 1976.

Adjusting for the state of economic activity and the rate of inflation, the postwar trend of after-tax ROC is slightly but insignificantly upward. The trend is still more strongly positive in the fourth equation, in which a dummy variable picks up the low ROCs experienced in the 1970s.

We conclude that the after tax ROC shows neither a downward nor an upward trend. Variations around its central tendency can be explained, in large part, by changes in the level of economic activity and in the rate of inflation.[32/]

Perhaps we should search not for long-term trends but also for sudden shifts in profitability. The economy of the 1970s may be fundamentally different than before. The poor profitability record of the last half dozen years is not fully explained by a slack economy and brisk inflation. The dummy variable for 1970-76 indicates that average ROC during this period was 1.5 percentage points lower than before, even after adjustment for inflation and the rate of growth of GNP. The coefficient of the dummy variable is statistically significant.

There has been a downward shift in profitability, but our fourth equation does not prove it is permanent. We could have fitted dummy variables to other subperiods--the mid-1960s, for example--and no doubt we could have obtained significant coefficients, particularly as the periods of abnormally high or low profitability can be picked by hindsight. None of these previous episodes was a permanent shift.

Our equations explaining ROC are effective but crude. Profitability responds to more than just inflation and the growth of GNP. Evidently these omitted variables have been unfavorable in the 1970s. We have no way of knowing whether they will continue unfavorable, but we are

inclined towards the longer view, and towards guessing that economists in 1987 will regard the first half of the 1970s as an unfortunate but transient period.[33/]

A similar exercise for the before-tax ROC is summarized in Table 10. With respect to time alone, the trend seems downward and borders on significance. However after adjusting for the other factors the influence of time alone is less strongly negative and is insignificant. In contrast with the ROC(AT), inflation is neither an important nor a significant determinant of the ROC(BT). Hence our conclusion is that inflation exercises its effect through an increase in corporate income tax liability.

With respect to declining trends in the before-tax ROC, we choose the option open to Scottish juries: "not proven."[34/]

TABLE 10

REGRESSION ANALYSIS OF BEFORE-TAX ROC, 1946-76

	Variable				
Equation	Time	Level of Economic Activity[a]	Inflation[b]	Dummy[c]	R^2
(1)	-0.19 (-2.21)				0.62
(2)	-0.11 (-1.26)	0.32 (8.07)			0.88
(3)	-0.14 (-1.20)	0.32 (8.35)	0.07 (1.31)		
(4)	-0.04 (-0.53)	0.32 (8.37)	0.04 (0.70)	-2.09 (-2.52)	0.91

Note: t statistics appear in parentheses under the coefficients. Values of two or more indicate significance.

[a] Annual percent change in real GNP.

[b] Annual percent change in Consumer Price Index.

[c] Equals zero for all years 1946-69, and one in each year from 1970 to 1976.

IV. THE LINK BETWEEN REAL AND FINANCIAL MARKETS

Introduction

We have now examined both physical asset and financial asset measures of NFC performance -- ROC and R, respectively. To a great extent they tell the same story. But further insights depend on a linking up of the physical and financial sectors. The most important specific issue is how real rates of return on corporate investment have behaved relative to capital costs.

It is difficult to measure the opportunity cost of capital directly, because it is defined in terms of expected returns on debt and equity securities. There is no simple way to infer expectations from historical returns.[35/]

But estimates of q can provide useful insights into whether the rate of return on corporate capital has declined relative to the cost of capital, which we denote as ρ. If, for example, we observe that q has declined, then we can infer that ROC has declined relative to ρ.[36/] Moreover, we can say this with reasonable confidence, since MV and CS, the determinants of q, are liable to less serious measurement errors than ROC or ρ.

We cannot use q to derive specific estimates of the rates of return or the cost of capital for any particular year. But the approach should permit us to identify changes in the spread between present and anticipated future profitability, on the one hand, and capital costs on the other. We believe this is the more relevant comparison. For example, it bears directly on the concern that the falling rate of return reduces the incentive to invest.[37/]

To summarize, changes in q over time for the NFC sector should provide a clear measure of how present and anticipated rates of return on real capital have behaved relative to the cost of capital.

The Behavior of q and ROC over Time

The time series of q_t for non-financial corporations is presented and discussed in Section II of this paper. It is replotted in Figure 5.[38] We see again that the early and mid-1950's were an unfavorable period relative to the mid-1960's.

Now, declining profitability does not depress stock and bond market values if capital costs decline proportionally. q depends not on ROC alone, but on the ratio of ROC to ρ. Therefore we interpret the last decade's downtrend in q as reflecting a decline in the rate of return earned by NFC's relative to the NFC opportunity cost of capital.

It is difficult to separate the effects of ROC and ρ on q, because we lack a reliable estimate of ρ. We can obtain a simple, rough measure, however. Figure 6 shows the ratio of NFC operating income to market value for the period 1946-76. (It is also presented as a percentage in Table 9). This ratio can be thought of as a generalized earnings-price ratio where "price" equals MV and "earnings" equals real operating income.[39] There is no evident trend in this ratio since the mid-1950s, and its volatility since then has been much less than in the first postwar decade.

If we can take the ratio as a rough estimate of ρ, we must conclude that ρ declined steadily from its postwar peak in the late 1940 s. But since 1956 it has fluctuated in a range from five to seven percent,[40] which matches the

Table 9

Ratio of Operating Income to Market Value
of Non-Financial Corporations, 1946-76

Year	Operating Income	Market Value of NFCs (Mid-year)	Ratio of Operating Income to Market Value (%)
1946	6.2	170.0	3.6
1947	9.9	141.6	7.0
1948	14.9	143.4	10.4
1949	14.7	124.3	12.0
1950	13.6	148.6	9.2
1951	13.3	154.3	8.6
1952	13.7	167.5	8.2
1953	12.7	175.0	7.3
1954	14.6	196.8	7.4
1955	19.6	263.1	7.4
1956	17.7	293.2	6.0
1957	18.1	297.0	6.1
1958	16.6	304.0	5.5
1959	22.1	397.0	5.6
1960	21.7	394.2	5.5
1961	21.8	468.9	4.6
1962	28.8	466.5	6.2
1963	32.0	541.4	5.9
1964	38.0	610.5	6.2
1965	45.0	688.2	6.5
1966	49.1	685.9	7.2
1967	48.2	743.5	6.5
1968	48.6	804.9	6.0
1969	46.2	837.0	5.5
1970	41.3	683.5	6.0
1971	46.7	850.3	5.5
1972	57.6	975.6	5.9
1973	59.5	1068.5	5.6
1974	46.0	1178.7	3.9
1975	63.6	1021.9	6.2
1976	77.6	1213.1	6.4

Source: Appendix Tables A1 and A4a.

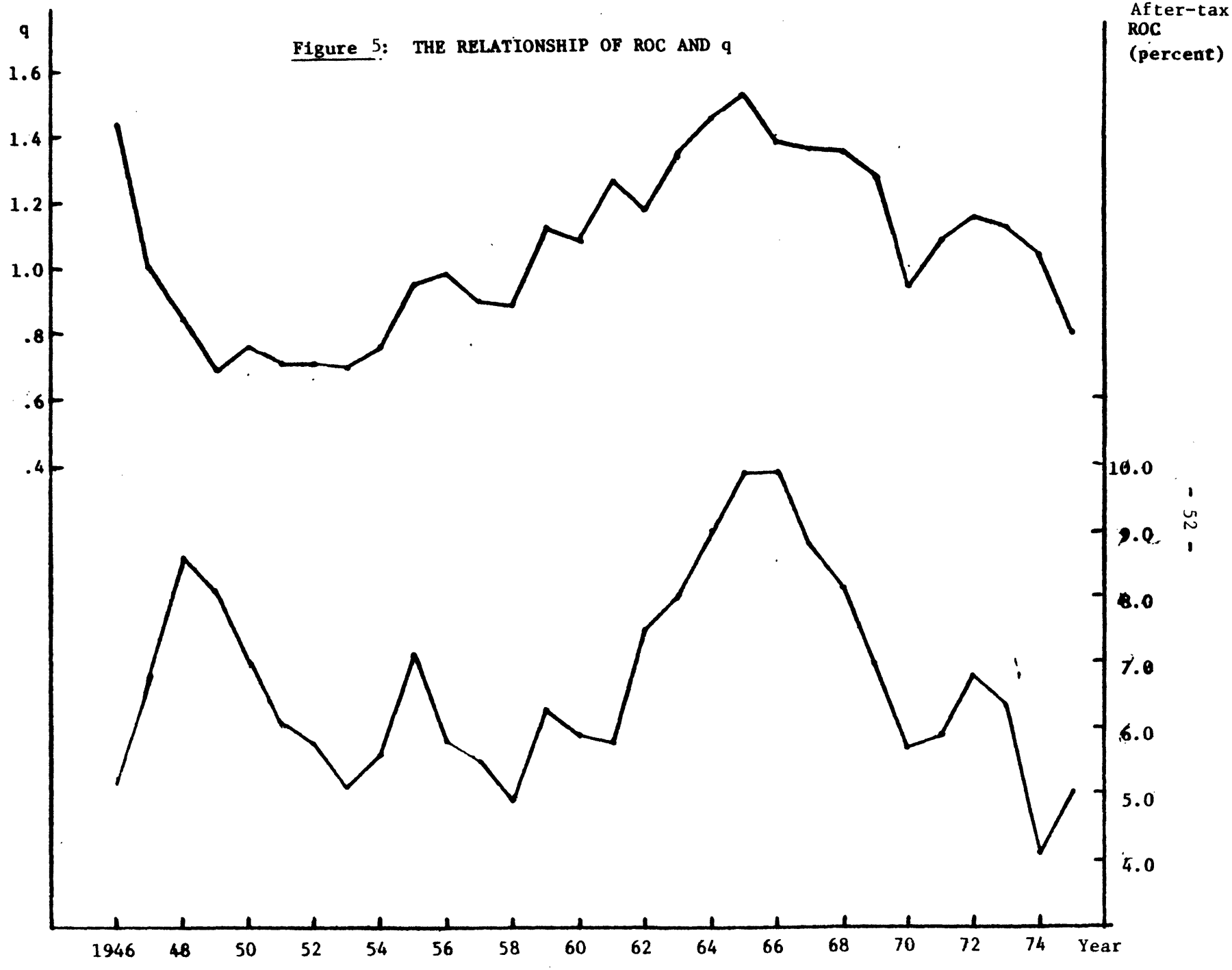
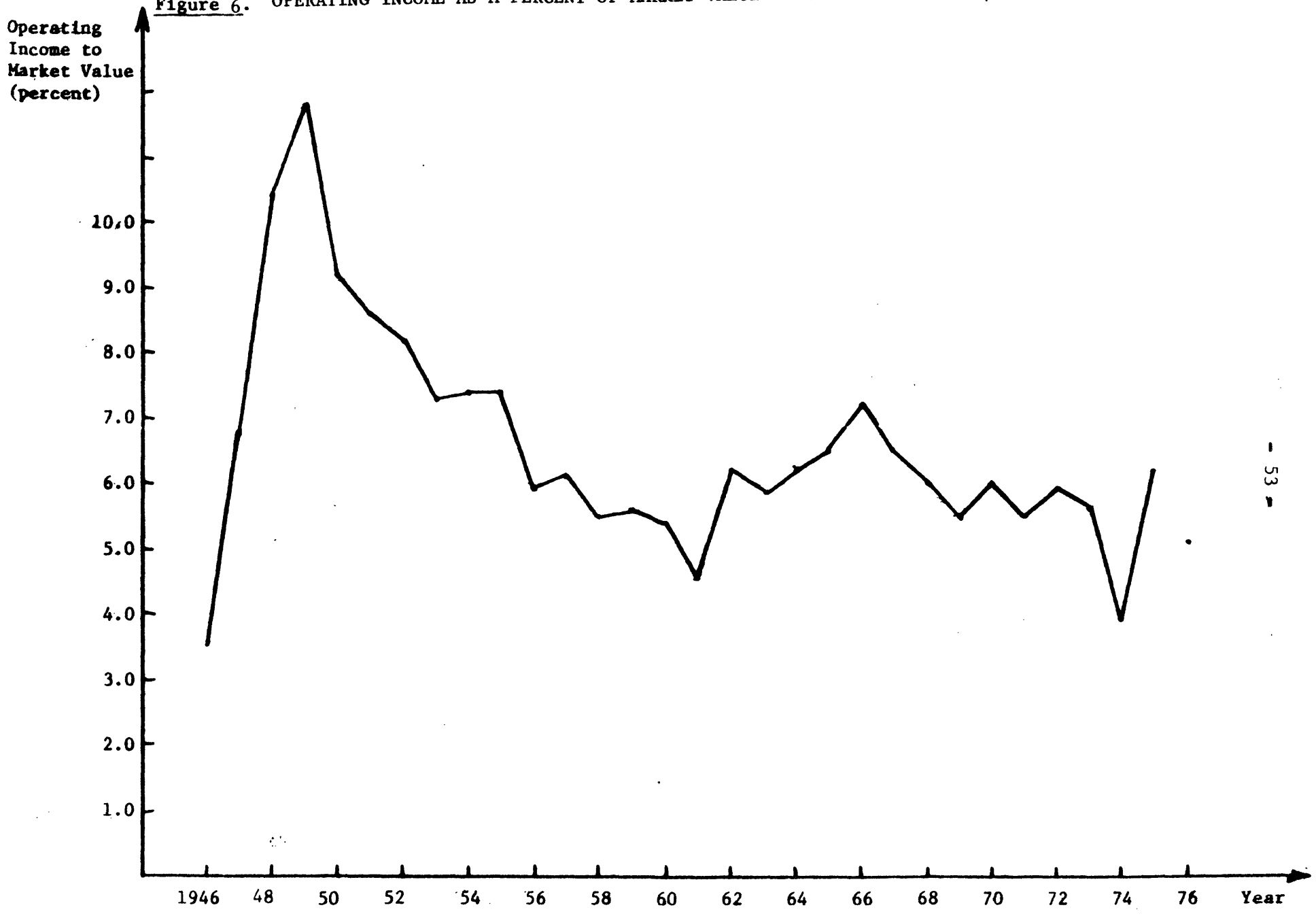


Figure 5: THE RELATIONSHIP OF ROC AND q
q
1.6
1.4
1.2
1.0
.8
.6
.4
After-tax ROC (percent)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
1946
48
50
52
54
56
58
60
62
64
66
68
70
72
74
Year

Figure 6. OPERATING INCOME AS A PERCENT OF MARKET VALUE OF NON-FINANCIAL CORPORATIONS



average after-tax ROC's over the postwar period and over the past 20 years (see Table 8). Thus it appears that NFCs have been earning roughly enough, on average, to cover their costs of capital.

Of course ROC has been well above and well below its average levels in the last 20 years. Our data strongly suggest that it is these fluctuations that account for the fluctuations in q over the last 20 years. As Figure 8 shows, the year-to-year movements in q and ROC correspond fairly well after 1958. There is no evident relationship before then.

We conclude, therefore, that the decline in corporate real profitability (ROC) over the last decade has not been matched by a corresponding decline in the real opportunity cost of capital.[41/]

The Absolute Value of q

As Figure 5 shows, q has averaged somewhat less than 1.0 over the last few years. One is tempted to conclude that NFCs are not earning enough to cover the opportunity cost of capital (ROC = ρ). But any such conclusion must be cautiously held. For one thing the Standard Base does not include some assets. Although changes in q are, we believe, a reliable signal of changes in ROC relative to ρ, the absolute value of q is a less trustworthy statistic.

Nevertheless, it is difficult to see how the "true" value of q could be much in excess of 1.0. If q is computed on the augmented capital base, for example, then its 1976 value becomes 0.79 rather than 0.88. Even the augmented base may be an underestimate of the replacement cost of all corporate assets. We know, for example, that the augmented base includes only the book value of land, not its current value. It is true that q would be higher if accelerated

rather than straight-line depreciation had been used in estimating the net replacement cost of plant and equipment. But the combined use of accelerated depreciation and the augmented base would not generate a value for q much in excess of 1.0.

Where are the intangible assets, the growth opportunities, and the monopoly rents? Apparently, in the last few years they have counted for very little when NFCs are examined in aggregate. We found this surprising. Financial economists are accustomed to pointing out the assets that accountants do not recognize -- going-concern value, the fruits of past research and development, product repuation, and so on. They have come to think of growth firms as an important part of our economy. They believe that some firms have monopoly power. In each case they can cite firms as examples to back up their beliefs. Yet these firms are evidently atypical. Judging from q, there is little evidence that intangible assets, growth opportunities, and monopoly rents have a significant impact on the current value of NFCs . although one or more of these effects must have been important in the mid-1960s, and also in earlier periods, e.g. 1934-39.

V. CONCLUSION

There is no question that NFCs have fared poorly since the mid-1960s. The fact is obvious from the low real rates of return realized by investors in NFCs. The poor performance is confirmed by declining operating profitability over the same period.

Whether the most recent data are viewed optimistically or pessimistically depends on which past period is taken as normal. The evidence is that in the mid-1960s the real profitability of NFCs was much higher, relative to the opportunity cost of capital, than it is now. On the other hand, NFCs are better off now than in the mid-1950s. Operating profitability (ROC) is about the same now as then, but the cost of capital is lower. (If there is a capital "shortage," it has as yet had no observable effect on the cost of capital.)

Over long periods -- 1946-76, or 1929-76 -- we have found no trend in the after-tax rate of return on corporate assets.

In the last few years the aggregate market value of NFCs was at most equal to the net replacement cost of all NFC assets. There was no evidence that capital markets in recent years perceived NFCs as having, in aggregate, substantial intangible assets or growth opportunities. The evidence we have presented gives no basis for concluding that current or anticipated ROCs on NFC assets exceed the current opportunity cost of capital.

It seems reasonable to say that the real cost of capital for NFCs has been about 6 to 7 percent since the late 1950s. The average long run real profitability of NFCs has also been 6 to 7 percent. In the period from 1929 up to the late 1950s, the annual cost of capital was a volatile series. Since then fluctuations in market value have been more closely related to variations in profitability than to shifts in the cost of capital.

Prospects for Further Research

Our research strategy in this paper has been to present and discuss various measures of profitability and capital costs for U.S. non-financial corporations in the aggregate. Many of our measures are rough; consequently we have restricted ourselves to broad questions. We are inclined to be skeptical of trends or sudden permanent shifts in corporate profitability, but we may have been forced to this position by the inadequacies of our measures, our limited understanding of the determinants of corporate profitability over time, and the lack of a formal model explaining aggregate market value in terms of operating income and other real variables.

Consequently we have a full agenda for further research. We plan to (1) disaggregate, (2) improve our measures and (3) formalize the analysis undertaken in this paper.

Disaggregation. The label "non-financial corporations" covers a variety of dissimilar firms. Useful information is lost in aggregation: understanding the parts is interesting in itself, and also helpful in understanding the whole.

It should be possible to develop measures of market values, returns to investors, operating profitability and cost of capital for the manufacturing and non-manufacturing sectors separately. This will require additional assumptions and approximations, but we believe useful estimates can be obtained.[42/]

There are severe difficulties in repeating our analysis for industry sub-groups within manufacturing. However, in our judgement, the analytical pay-off justifies the attempt.[43/]

Improved Measures. We need a more accurate representation of the value of and returns on a portfolio of all NFC securities.

1. The bond yields and holding period returns used in our study are for long term bonds only. Although this is a reasonable approximation, substitutes should be developed which relate more closely to the actual maturity structure of corporate debt.

2. Present estimates of equity values and returns depend on returns and yields of the Standard and Poors Composite Index. There may be serious errors here, because the index is based only on the largest firms. We should construct a value-weighted index based on a stratified sample of traded securities of nonfinancial corporations.

Such improvements would allow pursuit of finer comparisons. For example, it will be interesting to see whether the unusually high q's observed for the 1930s are true values or measurement errors. If they are the former, we may have something important to say about the macroeconomic history of that period.

We should also be able to trace changes in the business risk of U.S. NFCs over a 50-year period. This cannot be done solely from stock market data because market debt-equity ratios are continually shifting, and because lenders absorb some business risk. Shifts in business risk may help to explain shifts in the cost of capital.

In this connection too, we should improve our estimates of the augmented base, paying particular attention to land and long-term leases.

Formalization. Aside from the section on "Searching for Trends," there is no formal statistical analysis in this paper. In particular we have not attempted to specify or test a model linking real and financial variables.

There is a simple valuation model implicit in our conclusion that the real cost of capital has been stable at about 6 percent for the last 20 years.

We assumed market value equals current operating income capitalized at the cost of capital. If this is true, then the cost of capital equals current operating income divided by market value.[44/] We did not test this model. When we do we will be forced to make changes and extensions, for example:

1. We should in principle use expected future operating income. Investors do not naively project current performance into the indefinite future. That means we must develop a proxy for expected profitability.

2. We used the standard definition of operating income. Would other definitions work better? The valuation model provides a basis for testing which earnings series comes closest to true economic income as perceived by investors. We think that we can show that the standard definition, which is based on replacement cost accounting, is more closely related to actual market values than income based on historical cost accounts, even though the replacement cost data were not directly available to investors over the period we studied.

3. What about growth opportunities? Our measure of the cost of capital is essentially an earnings price ratio, a measure well known to be inadequate for growth firms. We should be able to develop a proxy for growth opportunities based on q.

FOOTNOTES

1. This report incorporates the research supported by the Massachusetts Institute of Technology's Project on International Business, the Ford Foundation and the Committee for Economic Development. We are grateful to the sponsors for their support and to Fischer Black, Jack Ciccolo, John Gorman, Everett Hagen, Robert Merton, and Allen Sinai for their help in acquiring necessary data and working out methodological issues. We thank Eugene Fama and Nicholas Gonedes for a careful review of our methodology and data, which we found very helpful. We are especially indebted to Sudipto Bhattacharya, Robert Jarrow and Richard Weiss, our research assistants on this project, and to Roger Hankin for permitting us to draw on his research on the link between corporate profitability and inflation [11]. The authors take full responsibility for errors, however.

2. The stock market's current valuation of growth firms like Hewlett-Packard or Digital Equipment Corporation can only be explained by the present value of profitable future investment opportunities. Current earnings are insufficient to account for these firms' values, even if capitalized at high-grade bond yields.

3. See, for example, Jensen's study of mutual fund performance [15] and other evidence summarized by Fama [8].

4. For evidence, see Lorie and Hamilton [18], Fama's review article [8], and the articles collected in Lorie and Brealey [17].

5. Earnings in this context are measured after taxes but before interest, since our portfolio contains debt as well as equity securities. Strictly speaking, we should subtract the present value of future investment

outlays from the present value of the future earnings these outlays are expected to generate. In short, we are using "earnings" loosely here.

6. R_t can be expressed as a weighted average of returns to creditors and stockholders.

$$R_t = R_t(D)\left(\frac{MV_t(D)}{MV_t}\right) + R_t(E)\left(\frac{MV_t(E)}{MV_t}\right), \qquad (1)$$

where $R_t(D)$ = the rate of return earned in year t on a portfolio of all the net outstanding debt of NFCs. $R_t(D)$ includes interest receipts and capital gains or losses.

$MV_t(D)$ = the market value of that debt portfolio at the start of year t.

$R_t(E)$ = the rate of return earned in year t on a portfolio of all the equity shares of all NFCs. $R_t(E)$ includes both dividends and capital gains.

$MV_t(E)$ = the market value of that equity portfolio at the start of year t.

MV_t = the total market value of all NFC securities $(MV_t(D) + MV_t(E))$ at the start of year t.

Thus R_t is the rate of return earned on a portfolio of all securities issued by NFCs. It is the return to all bond- and stockholders considerd as a group.

7. R_t does not, however, measure the return earned by the government via taxation. In a sense MV_t understates the value to society of NFCs, because it does not include the present value of future taxes.

8. There is no reason for the relative past performance of stocks and bonds to affect firms' future capital investment decisions, for example.

9. Our procedures for estimating MV_t follow those developed by John Ciccolo in [5]. We are grateful for his assistance.

10. We are <u>not</u> implying that there are meaningful trends or cycles in the rates of return shown in Table 1. It is not possible to predict future R_t's from the historical figures shown. No investor standing at any point in the 1947-75 period could have used the R_t's observed up to the point to predict future R_t's. It is only hindsight that allows us to interpret the history of rates of return.

11. CS_t, the denominator of q_t, is an average of starting and ending values of NFC capital stock and inventories. Thus CS_{1950} is a simple average of figures for the end of 1949 and the end of 1950. MV_t is estimated as of mid-year -- the end of the second quarter of year t. This convention facilitates comparison to the rate of return measures presented in Section III below. Unfortunately, it also makes it difficult to match year-by-year fluctuations in MV/CS and R, since R is based on market values computed at the <u>end</u> of calendar years. We do not attach much significance to any single year's value of MV/CS or R, however.

12. James Tobin has emphasized the importance of this ratio and employed it in theoretical and empirical work. See, for example, [27] and [29].

See also the 1977 Economic Report of the President [7], pp. 28-29.

13. [7], p. 28.

14. Slippery issues are encountered as soon as one tries to specify exactly what assets should in principle go into the demoninator of q. There is no reason for excluding assets just because they are intangible. But, as Fischer Black has pointed out to us, all of MV_t can in principle be traced to some tangible or intangible asset. If so, the true value of q equals 1.0 by definition.

But we would exclude one type of intangible asset from the denominator, namely the ability to earn rates of return in excess of the opportunity cost of capital on investments undertaken by the firm. In other words, we would not capitalize rents or quasi-rents and include them in the denominator. We concede the difficulty of distinguishing intangible assets purchased by the firm from capitalized rents, but still maintain that q is a useful index of corporate profitability relative to the opportunity cost of capital.

15. This statement is strictly true only in a partial equilbrium analysis.

16. We are indebted to John A. Gorman, Assistant to the Associate Director for National Income Accounts, for supplying revised data prior to their publication in the Survey of Current Business.

17. Remember that the ROCs shown in Table 3 are intended as measures of

real, not monetary, rates of return. They should be compared to the real rates of return in Table 1, and to real, not nominal, interest rates.

18. See Hankin [11]. This study was based on measures of ROC which are slightly different from those used in our study. Later he was kind enough to replicate his results using the ROCs reported in Table 3. The results for the after-tax ROC for 1946-76 are as follows. t-statistics are given in parenthesis.

$$\underset{}{ROC(AT)} = \underset{(7.40)}{5.83} + \underset{(0.79)}{.06T} + \underset{(4.43)}{.14\Delta GNP} - \underset{(-3.10)}{.16\Delta P}$$

where T = a linear time trend from 1946 to 1976. T is standardized to have a mean of zero.

ΔGNP = the percentage change in real GNP.

ΔP = the percentage change in the consumer price index.

The equation was fitted using a Cochrane-Orcutt iterative technique to correct for a serious positive autocorrelation of residuals ($\rho = .80$).

19. We stop the comparison with 1972, the most recent year for which revised data for the alternative assumptions were available.

20. Current corporate accounting practice differs from historical cost accounting calculated from the NIPA data. Many firms use LIFO inventory accounting, for example, and assume shorter depreciable lives than 85 percent of Bulletin F

21. Christensen and Jorgenson [4] have developed estimates of rates of

return for the entire corporate sector (not just NFC's) after all taxes, including property taxes and personal income taxes on corporate income.

22. The specific items were cash, accounts receivable, land, intangibles, and other assets. Accounts payable and other non-interest bearing liabilities were subtracted. "Investments" were not added, because most items in this category are interest-bearing marketable securities, and operating income is measured before net interest paid. That is, the interest income earned on these assets is subtracted from interest paid on NFC debt. Because the interest income on investments is not included in the numerator of the ROC calculation, it is inappropriate to include the value of these investments in the denominator.

23. Averages for after-tax ROC for the three periods we have distinguished are as follows (figures in percent):

	Table 3		Table 6
1946-60	6.3	1947-60	5.7
1961-70	8.0	1961-70	7.1
1971-75	5.6	1971-75	4.9

24. See [7], p. 29 and p. 69.

25. Let CS_t and INV_t be the net replacement cost of a firm's capital stock and inventory, respectively, at the end of period t. Then the total nominal income realized in period t includes operating income, net of depreciation calculated on CS_{t-1}, plus the holding gains realized on capital stock and inventories. Thus

$$\begin{matrix}\text{Total Nominal Income}\end{matrix} = \begin{matrix}\text{Operating Income}\end{matrix} + \begin{matrix}\text{Nominal Holding Gains}\end{matrix}$$

The holding gain on capital stock is

$$\begin{matrix}\text{Nominal Holding Gain}\end{matrix} = CS_t - CS_{t-1} + \begin{matrix}\text{Depreciation Charged Against } CS_{t-1}\end{matrix} - \begin{matrix}\text{Capital Acquired During Period t}\end{matrix}$$

The holding gain on inventory is computed in the same way.

These holding gains are nominal because they are partly or wholly due to inflation. CS_t is computed in period t dollars, while CS_{t-1} is computed in t-1 dollars. We could calculate <u>real</u> holding gains by re-expressing CS_{t-1} in period t dollars. If i_t is the general inflation rate (the change in Consumer Price Index, for example) between periods t-1 and t, then the real holding gain on capital stock is

$$\begin{matrix}\text{Real Holding Gain}\end{matrix} = CS_t - (1+i_t)CS_{t-1} + \begin{matrix}\text{Depreciation Charged Against } CS_t\end{matrix} - \begin{matrix}\text{Capital Acquired During Period t}\end{matrix}$$

Here we assume that operating income, depreciation and acquisitions of capital stock and income are all expressed in period t dollars.

If replacement costs increase <u>only</u> in response to general inflation -- i.e. at exactly the rate i_t -- then <u>real</u> holding gains are zero. This, in turn, means that real total income is just exactly equal to operating income.

(There is no need to distinguish between real and nominal operating income. Operating income is expressed in period t dollars, which are the units of measurement for both real and nominal total income.)

26. The holding gains have no evident relationship to q or to the real rates of return earned by investors.

27. [23], pp. 180-181.

28. [23], pp. 205-208.

29. The revisions increase ROC in only one year -- 1956. It is unaffected in 1955 and 1957. It is reduced in all other years between 1948 and 1962. For the ROC(AT) the reduction is 0.7 percentage points for 1948, and about 0.2 percentage points for most years before 1962.

30. Hankin [11] worked with ROC data from an earlier version of this study. Our tests essentially replicate his model, except for slight changes in and additions to the ROC figures.

31. The Cochrane-Orcutt iterative technique was used to adjust for auto-correlation.

32. Our conclusion rests on a larger statistical inquiry than the one reproduced in Table 9. We tried other variables--percentage utilization of capacity and lagged inflation--as substitutes for and in combination with the two in Table 9 and ended up with the same general result.

33. We end up echoing Feldstein's and Summer's arguments, and refer the reader to [9], pp. 217-24 for a more extensive discussion. Their analysis and statistical tests were helpful in our work.

34. For a more rigorous verdict denying a declining trend see Feldstein and Summers [9].

35. We believe Nordhaus is the only investigator who has attempted to measure and compare trends in the rate of return and the cost of capital. But his cost of capital measure is flawed by (1) the use of book, rather than market values, for debt and equity in his weighted average cost of capital measure; (2) an inappropriate adjustment for the tax shield provided by interest; (3) using a risk-free rate to measure the expected rate of return on corporate bonds; and (4) using the earnings-price ratio for the expected market rate of return on equity. (See [18], esp. p. 199.) Assumption (4), or some equally simple rule of thumb, is perhaps unavoidable when dealing with aggregate data. But the first three assumptions can be improved upon.

36. Modern financial theory shows that the market value of a firm (MV) equals the capitalized value of the long-run average earnings from assets now in place (Y/ρ), plus the present value of growth opportunities (PVGO).

$$MV = \frac{Y}{\rho} + PVGO \quad . \qquad (2)$$

The capitalization rate ρ is the equilbrium expected rate of return established in capital markets for this firm and others of equivalent risk.

Earnings are equal to the return on capital times real capital (CS). Thus $Y = ROC(CS)$, and

$$MV = CS\left(\frac{ROC}{\rho}\right) + PVGO \quad . \qquad (3)$$

PVGO is the present value of future opportunities to invest at rates of return in excess of the cost of capital. Growth is worth nothing if expected ROC on future investment just equals ρ. If ROC = ρ now and for the future, the market value of the firm just equals the value of its real capital.

Thus q, the ratio of MV to RC, depends on the ratio of ROC to ρ:

$$q = \frac{MV}{CS} = \frac{ROC}{\rho} + \frac{PVGO}{CS} \quad , \tag{4}$$

where PVGO is a function of ROC/ρ and the rate of expansion of real capital stock.

Now, by identifying changes in q with changes in ROC/ρ, we are actually assuming a constant expected long-term rate of expansion in real capital stock. It is conceivable that q could vary due to changes in the expected rate of investment, even with ROC and ρ constant. But we consider this unlikely, for two reasons. First, if ROC and ρ are constant, there is no obvious mechanism to account for changes in the real investment rate. If the real rate of investment increases as ROC/ρ increases,then that merely strengthens the relationship between q and ROC/ρ. Second, Figures 7 and 8 below show that recent fluctuations in MV can be largely accounted for by changes in ROC.

37. We do not claim that this approach is without its own difficulties. For example, there are problems in defining and measuring real capital, and in estimating market values. These problems are likely to be partic-

ularly severe in cross-sectional comparisons. There is little meaning in comparing the q's of the drug and steel industries, for example, since so much of the drug industry's assets do not show on balance sheets. (Comparisons of the industries' ROCs would be just as suspect -- perhaps more so.) At best one could make rough adjustments such as capitalizing and amortizing advertising and outlays on research and development. On the other hand, biases in estimating CS or MV are not likely to be volatile over time. Thus a change in q can be clearly interpreted even though the absolute value of the ratio cannot.

38. Values of q and ROC presented in Figure 8 are calculated from the standard, rather than the augmented, estimates of capital stock.

39. The ratio of operating earnings to MV is as close as we can get to a direct estimate of the real cost of capital ρ. In principle we should estimate

$$\rho_t = \rho_t(D)\left(\frac{MV_t(D)}{MV_t}\right) + \rho_t(E)\left(\frac{MV_t(E)}{MV_t}\right) . \qquad (5)$$

Eq. (5) corresponds to Eq. (1) (fn. 6), except that the ρ's are expected rates of return -- e.g., $\rho_t = E(R_t)$. Now, if the total expected dollar return to debt and equity is just equal to Y_t, i.e.,

$$\rho_t MV_t = \rho_t(D)NV_t(D) + \rho_t(E)MV_t(E) = Y_t, \qquad (6)$$

then $\rho_t = Y_t/MV_t$, which is the ratio plotted in Figure 7. Unfortunately, Eq. (6) makes a number of implicit assumptions. For example, it holds only if growth opportunities are absent (PVGO = 0) and if Y_t equals

investors' expectations of average future earnings generated by assets held at t.

40. An exception is 1974. Over the period 1956-76, ρ averaged 5.85 percent with a standard deviation of 0.69; from 1946-55, the average value was 8.11 percent, with a standard deviation of 2.24.

41. Remember that we have estimated in real terms. The current perception of high capital costs is based on nominal rates.

42. From the NIPA data we could estimate the before-tax ROC 1947 to date, for all manufacturing companies (corporations, proprietorships, and partnerships).

The denominator is directly available. For the numerator, the excess of NIPA replacement cost depreciation over tax return depreciation would have to be estimated. With some further work we could also derive an estimate of the after-tax ROC for manufacturing.

43. Further disaggregation--for example, a two-digit SIC breakdown for manufacturing (20 industries)--would be substantially more difficult. Profits are available, for corporations only, to this degree of industry detail. But these figures are computed on a company basis of industrial classification. The IVA, net interest, and excess of replacement cost depreciation over tax return depreciation, if available, would be on an establishment basis. So a bridge between company and establishment data would have to be built. Moreover, capital stock figures presently are available only for aggregate manufacturing, and would have to be apportioned among industries on the basis of Statistics of Income totals, or some other source.

Despite the difficulties we think that usable estimates may be possible. Given the enriched analysis they would permit, a serious attempt at a two-digit industry breakdown for manufacturing is warranted.

44. If $MV_t = Y_t/\rho_t$, then $\rho_t = Y_t/MV_t$. Here ρ_t is the cost of capital, MV_t market value, and Y_t is current operating income.

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Note: See Appendix for discussion of data sources and computational Procedures.

Statistical Appendix

In this Appendix we tabulate the estimates prepared for our study. Notes that explain the derivation of the estimates follow each table.

Items listed in the footnotes to the Appendix tables are cited in full in our list of References. If the indicated source does not appear in the list of References, it is a standard source of statistical information which requires no further identification.

Table A1

Market Value of Debt and Equity of Nonfinancial Corporations, 1929 to 1976

(billions)

Year	Market Value of Debt[a]	Market Value of Equity[b]	Total
1929	$23.1	$154.3	$177.4
1930	26.7	124.4	151.1
1931	22.3	65.7	88.0
1932	16.0	24.8	40.8
1933	28.2	47.7	75.9
1934	31.8	66.5	98.3
1935	35.2	61.6	96.8
1936	38.8	123.9	162.7
1937	38.5	105.9	144.4
1938	32.6	46.1	78.7
1939	35.6	77.2	112.8
1940	32.0	64.5	96.5
1941	35.4	58.7	94.1
1942	37.3	47.4	84.6
1943	32.5	84.6	117.1
1944	32.4	85.4	117.7
1945	33.7	99.3	133.0
1946 I	21.4	129.5	150.8
II	24.7	145.3	170.0
III	24.5	138.4	162.9
IV	24.1	128.7	152.7
1947 I	25.6	124.7	150.3
II	22.2	119.4	141.6
III	25.2	124.5	149.7
IV	23.8	115.1	138.9
1948 I	25.6	112.4	138.0
II	25.9	117.4	143.4
III	23.7	128.4	152.2
IV	22.9	115.8	138.7
1949 I	26.1	102.5	128.5
II	29.0	95.3	124.3
III	28.9	96.3	125.2
IV	29.8	100.9	130.7
1950 I	27.8	112.1	139.9
II	27.9	120.8	148.6
III	27.1	124.1	151.2
IV	28.0	125.2	153.1

Table A1 (continued)

Year	Market Value of Debt	Market Value of Equity	Total
1951 I	31.6	119.2	150.8
II	29.9	124.4	154.3
III	31.2	128.6	159.7
IV	31.1	130.4	161.6
1952 I	33.4	123.3	156.7
II	34.3	133.2	167.5
III	34.3	137.3	171.6
IV	36.7	140.9	177.6
1953 I	34.2	138.7	172.9
II	32.9	142.1	175.0
III	33.7	137.4	171.0
IV	36.7	135.4	172.0
1954 I	38.8	152.1	190.8
II	43.1	153.5	196.6
III	45.9	176.0	221.8
IV	52.2	185.7	237.9
1955 I	46.1	205.1	251.2
II	45.7	217.4	263.1
III	44.9	254.6	299.6
IV	44.4	239.5	284.0
1956 I	44.6	238.6	283.1
II	45.7	247.5	293.2
III	45.8	252.5	298.3
IV	44.6	247.0	291.6
1957 I	44.8	234.2	297.1
II	46.4	250.6	297.0
III	45.6	256.0	301.6
IV	47.6	225.1	272.7
1958 I	53.0	232.0	285.0
II	56.4	247.6	304.0
III	59.7	267.0	324.9
IV	59.4	288.6	348.1
1959 I	59.6	321.1	380.7
II	62.6	334.4	397.0
III	62.5	343.9	406.4
IV	62.6	340.6	403.2
1960 I	62.2	331.4	393.5
II	64.8	329.5	394.2
III	68.7	338.1	406.8
IV	72.6	327.6	400.2

Table A1 (continued)

Year	Market Value of Debt	Market Value of Equity	Total
1971 I	208.7	640.6	849.3
II	205.6	644.7	850.3
III	203.5	661.3	864.8
IV	217.6	605.0	822.6
1972 I	219.9	735.4	955.3
II	223.8	751.8	975.6
III	235.0	767.6	1002.6
IV	257.8	800.0	1057.8
1973 I	273.5	823.1	1096.6
II	289.3	779.3	1068.5
III	298.7	787.8	1086.5
IV	325.8	738.9	1064.7
1974 I	338.0	727.0	1065.0
II	340.3	838.4	1178.7
III	332.3	674.8	1007.1
IV	324.1	531.2	855.3
1975 I	317.7	627.7	945.4
II	323.1	698.8	1021.9
III	332.4	683.1	1015.5
IV	332.4	690.8	1023.2
1976 I	330.4	760.1	1090.5
II	355.6	857.5	1213.10
III	379.4	889.2	1268.6
IV	408.3	862.9	1271.2

a. Market value of debt. Net interest paid by NFCs was capitalized at Moody's Baa corporate bond rate. After 1945, net interest was available by quarter. Data for 1929 to 1972 are from United States Department of Commerce, Bureau of Economic Analysis, The National Income and Product Accounts of the United States, 1929-74, Statistical Tables [20]. Data for 1973 to 1976, from current issues of Survey of Current Business.

Yields were taken from Moody's Industrial Manual. Yields used to capitalize quarterly net interest are simple averages of yields quoted for each month in the quarter. For 1929 to 1945, the yield quoted for June was used.

b. Market value of equity. Net dividend payments by NFCs were capitalized at the dividend yield of the Standard and Poor's Composite Index.

Annual and quarterly dividend payments are available from source cited in note a for net interest.

The dividend yield used was an arithmetic average of monthly indexes reported for April, May and June, taken from Standard and Poor's Trade Statistics.

Table A2a

Net Capital Stock of
Nonfinancial Corporations, 1929 to 1976

Standard Base-- Straight-Line Depreciation,
Service Lives 85 percent of Bulletin F

(billions of current dollars)

Year	1. Net Residential Capital[a]	2. Net Non-residential Capital[b]	3. Average Net Fixed Capital Stock[c]	4. Inventory[d]	5. Net Capital Stock[e]
1928	3.0	$64.5			
1929	3.1	64.9	$67.8	$24.0	$91.8
1930	3.0	61.8	66.4	23.0	89.4
1931	2.5	55.3	61.3	19.8	81.1
1932	2.2	49.6	54.8	16.6	71.4
1933	2.3	48.2	51.2	15.7	66.9
1934	2.3	47.9	50.4	16.8	67.1
1935	2.3	47.2	49.9	17.5	67.3
1936	2.5	49.4	50.7	18.9	69.6
1937	2.7	51.9	53.3	20.7	74.0
1938	2.7	50.5	53.9	20.5	74.4
1939	2.7	50.3	53.1	20.4	73.5
1940	2.9	53.4	54.7	22.0	76.7
1941	3.1	59.8	59.6	25.9	85.5
1942	3.3	63.8	65.0	30.1	95.1
1943	3.4	64.2	67.4	31.3	98.7
1944	3.6	64.7	68.0	31.2	99.2
1945	3.8	70.5	71.3	30.6	101.9
1946	4.3	85.4	82.0	36.4	118.4
1947	4.8	106.0	100.3	46.3	146.6
1948	5.0	128.0	118.2	52.6	170.8
1949	5.2	125.0	129.4	52.5	181.9
1950	5.5	141.7	140.2	55.6	195.8
1951	5.7	157.3	155.0	65.5	220.6
1952	5.8	167.3	168.1	71.5	239.6
1953	5.8	177.0	178.0	73.0	251.0
1954	5.9	185.4	187.1	73.0	260.1
1955	6.1	202.8	200.1	75.7	275.8
1956	6.3	226.2	220.7	83.4	304.1
1957	6.6	243.8	241.5	88.3	329.8
1958	7.2	251.2	254.4	86.9	341.3
1959	7.8	258.8	262.5	90.5	353.0
1960	8.5	265.9	270.5	95.6	366.1

Table A2a (continued)

Year	1. Net Residential Capital	2. Net Nonresidential Capital	3. Average Net Fixed Capital Stock	4. Inventory	5. Net Capital Stock
1961	9.4	271.2	277.5	95.2	372.7
1962	10.7	279.8	285.6	100.9	386.5
1963	12.2	289.1	295.9	106.3	402.2
1964	13.8	303.8	309.5	112.3	421.8
1965	15.3	328.9	330.8	121.7	452.5
1966	16.6	363.2	362.0	134.8	496.8
1967	18.5	397.1	397.7	148.6	546.8
1968	22.0	438.0	437.8	165.1	602.9
1969	25.4	489.2	487.3	175.8	663.1
1970	27.7	537.3	539.8	189.2	729.0
1971	30.2	580.1	587.7	199.1	786.8
1972	34.6	629.4	637.2	209.6	846.8
1973	41.3	721.8	713.6	236.4	950.0
1974	46.7	852.9	831.4	300.7	1132.1
1975	50.9	943.5	947.0	322.0	1269.0
1976	53.8	997.6	1022.9	352.4	1375.3

a. Net residential capital of NFCs end of year, from Capital in the United States [3], p. 308. Data for 1974-76 from Current Business, August, 1977, p. 57.

b. Net fixed nonresidential capital of nonfinancial corporations, end of year, from Capital in the United States [3], p. 115. Data for 1974-76 Survey of Current Business, August, 1977, p. 59.

c. "Average" means the average of beginning and end of year values. For example, the average net residential capital for 1950 would be the average of figures given for 1949 and 1950 in column 1. Column 3 is obtained by adding columns 1 and 2 and taking an average for each year.

d. Figures for 1929 to 1958 are averages of beginning and end of year values. Second quarter inventories are reported after 1958. Source: data furnished by John Gorman of the Bureau of Economic Analysis.

e. Sum of columns 3 and 4.

Table A2b

Net Capital Stock of

Nonfinancial Corporations, 1946 to 1972

Double-Declining-Balance Depreciation,

Service Lives 85 percent of Bulletin F

(billions of current dollars)

Year	1. Net Residential Capital	2. Net Non-residential Capital	3. Average Net Fixed Capital Stock	4. Inventory	5. Net Capital Stock
1945	$3.8	$56.3			
1946	4.3	68.7	$66.6	$36.4	$103.0
1947	4.8	86.1	82.0	46.3	128.3
1948	5.0	98.4	97.2	52.6	149.8
1949	5.2	104.3	106.5	52.5	159.0
1950	5.5	115.4	115.2	55.6	170.8
1951	5.7	128.2	127.4	65.5	192.9
1952	5.8	136.3	138.0	71.5	209.5
1953	5.8	144.4	146.2	73.0	219.2
1954	5.9	151.1	153.6	73.0	226.6
1955	6.1	165.3	164.2	75.7	239.9
1956	6.3	184.7	181.2	83.4	264.6
1957	6.6	199.1	198.4	88.3	286.7
1958	7.2	204.1	208.5	86.9	295.4
1959	7.8	209.7	214.4	90.5	304.9
1960	8.5	215.3	220.7	95.6	316.3
1961	9.4	219.4	226.3	95.2	321.5
1962	10.7	226.5	233.0	100.9	333.9
1963	12.2	234.2	241.8	106.3	348.1
1964	13.8	246.6	253.4	112.3	365.7
1965	15.3	268.3	272.0	121.7	393.7
1966	15.6	297.5	298.9	134.8	433.7
1967	18.5	325.2	328.9	148.6	477.5
1968	22.0	358.5	362.1	161.5	523.6
1969	25.4	400.1	403.0	175.8	578.8
1970	27.7	438.2	445.7	189.2	634.9
1971	30.2	471.7	483.9	199.1	683.0
1972	34.6	511.4	524.0	209.6	733.6

Notes

Definitions and computational procedures are identical with those used in Table A2a, except for the shift to double-declining balance depreciation for net nonresidential capital. Column 2 is from Capital in the United States [3], p. 308.

Table A2c

Net Capital Stock of Nonfinancial Corporations, 1946 to 1972

Straight-Line Depreciation, Service Lives Shifting from Bulletin F to 75 percent of Bulletin F over Time [a]

(billions of current dollars)

Year	1. Net Residential Capital	2. Net Non-residential Capital	3. Average Net Fixed Capital Stock	4. Inventory	5. Net Capital Stock
1945	$3.8	$84.0			
1946	4.3	100.8	$96.5	$36.4	$132.9
1947	4.8	123.5	116.7	46.3	163.0
1948	5.0	138.9	136.1	52.6	188.7
1949	5.2	146.5	147.8	52.5	200.3
1950	5.5	161.3	159.3	55.6	214.9
1951	5.7	177.9	175.2	65.5	240.7
1952	5.8	188.1	188.8	71.5	260.3
1953	5.8	197.8	198.8	73.0	271.8
1954	5.9	205.9	207.7	73.0	280.7
1955	6.1	223.7	220.8	75.7	296.5
1956	6.3	247.4	241.8	83.4	325.2
1957	6.6	264.3	262.3	88.3	350.6
1958	7.2	270.4	274.3	86.9	361.2
1959	7.8	276.5	281.0	90.5	371.5
1960	8.5	281.6	287.2	95.6	382.8
1961	9.4	284.6	292.1	95.2	387.3
1962	10.7	290.7	297.7	100.9	398.6
1963	12.2	297.4	305.5	106.3	411.8
1964	13.8	309.5	316.5	112.3	428.8
1965	15.3	337.8	335.2	121.7	456.9
1966	16.6	362.8	363.3	134.8	498.1
1967	18.5	393.1	395.5	148.6	544.1
1968	22.0	430.3	432.0	161.5	593.5
1969	25.4	477.1	477.4	175.8	653.2
1970	27.7	520.4	525.3	189.2	714.5
1971	30.2	558.0	568.2	199.1	767.3
1972	34.6	602.1	612.5	209.6	822.1

a. Definitions and computational procedures are the same as those used in Table A2a except for the different assumptions about service lives. Column 2 is from Capital in the United States [3], p. 247. Estimates in this column are based on the following assumption concerning service lives: 100 percent of Bulletin F up to 1940, a gradual decline to 75 percent from 1940 to 1960, and continuing at 75 percent from 1960 on.

Table A2d

Net Capital Stock of Nonfinancial Corporations, 1946 to 1972

Straight Line Depreciation Based on Historical Cost, Service Lives 85 percent of Bulletin F[a]

(billions of current dollars)

Year	1. Net Residential Capital	2. Net Non-residential Capital	3. Average Net Fixed Capital Stock	4. Inventory	5. Net Capital Stock
1945	$2.2	$51.7			
1946	2.2	58.8	$57.4	$36.4	$93.8
1947	2.3	70.5	66.9	46.3	113.2
1948	2.4	82.1	78.6	52.6	131.2
1949	2.5	90.5	88.7	52.5	141.2
1950	2.7	99.4	97.5	55.6	153.1
1951	2.8	110.8	107.8	65.5	173.3
1952	2.9	121.5	119.0	71.5	190.5
1953	3.0	133.6	130.5	73.0	203.5
1954	3.1	143.6	141.7	73.0	214.7
1955	3.3	155.4	152.8	75.7	228.5
1956	3.6	170.6	166.4	83.4	249.8
1957	3.9	186.6	182.3	88.3	270.6
1958	4.3	196.5	195.6	88.1	283.7
1959	4.9	207.5	206.6	90.5	297.1
1960	5.6	219.7	218.8	95.6	314.4
1961	6.6	230.0	231.0	95.2	326.2
1962	7.8	242.5	243.5	100.9	344.4
1963	9.3	254.4	257.1	106.3	363.4
1964	10.9	269.6	272.2	112.3	384.5
1965	12.4	291.7	292.3	121.7	414.0
1966	13.7	318.8	318.3	134.8	453.1
1967	14.8	343.9	345.6	148.6	494.2
1968	16.4	370.9	373.0	161.5	534.5
1969	18.4	402.0	403.8	175.8	579.6
1970	20.2	430.2	435.4	189.2	624.6
1971	22.3	458.9	465.8	199.1	664.9
1972	25.1	492.2	499.2	209.6	708.8

a. Definitions and computational procedures are the same as those used in Table A2a, except that asset values are based on historical (original) cost. Columns 1 and 2 are from Capital Stock in the United States [3], pp. 331 and 169 respectively.

Table A3

Derivation of Augmented Net Capital Base of Nonfinancial Corporations, 1946 to 1976

(billions of current dollars)

Year	1. Standard Base[a]	2. Cash[bc]	3. Accounts Receivable[bc]	4. Other Net Current Assets[b]	5. Land and Intangibles[be]	6. Addition to Standard Base[b]	7. Augmented Base
1947	$146.6	$23.4	$31.0	-$43.5	$12.1	$22.3	$168.9
1948	170.8	23.2	35.3	-46.7	12.8	23.8	194.6
1949	181.9	23.4	33.5	-41.9	10.5	25.1	207.0
1950	195.8	25.5	45.5	-59.2	14.3	25.8	221.6
1951	220.6	26.7	48.2	-65.0	12.9	24.4	245.0
1952	239.6	29.2	58.0	-90.0	14.7	17.3	256.9
1953	251.0	27.5	52.0	-66.0	13.5	19.5	270.5
1954	260.1	29.3	55.1	-69.0	14.4	28.4	288.5
1955	275.8	30.2	65.0	-80.0	16	30.5	306.3
1956	304.1	30.0	70.5	-86.0	17	31.4	335.5
1957	329.8	30.1	73.0	-82.0	17.7	34.2	364.0
1958	342.5	32.1	79.7	-87.0	19	41.2	383.7
1959	353.0	31.1	85.0	-100.0	21.5	40.7	393.7
1960	366.1	32.0	87.0	-104.0	24	38.3	404.4
1961	372.7	34.0	96.0	-112.0	25	41.0	413.7
1962	386.5	35.0	101.0	-121.0	26.5	42.3	428.7
1963	402.2	36.3	109.0	-133.0	29.8	41.8	444.0
1964	421.8	37.7	125.0	-144.0	31	55.9	477.7
1965	452.5	39.7	150.9	-161.0	36	50.6	503.1
1966	496.8	41.0	154.0	-176.0	39	61.8	558.6
1967	546.3	44.8	166.0	-189.0	50	64.9	611.2
1968	597.8	47.5	186.0	-220.0	75	80.2	678.0
1969	661.6	48.1	219.0	-256.0	69	82.3	743.9
1970	729.0	50.6	227.0	-273.0	78	81.4	810.4
1971	786.8	54.8	240.0	-292.0	80	82.7	869.5
1972	846.8					101.4	948.2
1973	950.0					113.8	1063.7
1974	1132.1					135.5	1267.6
1975	1269.0					151.9	1420.9
1976	1375.3					164.6	1539.9

Note: Columns 1, 6 and 7 are averages of beginning-and-end-of-year values. Columns 2, 3, 4 and 5 are end of year values.

a. The standard base is taken from Table A2a.

b. Estimates of NFCs nonfinancial assets other than capital stock and inventory are taken from Statistics of Income, Corporation Income Tax Returns, 1947-71. Figures after 1971 were estimated as follows. Average ratios of cash, accounts receivable, and other net current assets to the standard base were computed for 1966 to 1971. These ratios were multiplied by the standard base to obtain estimates for 1972, 1973, 1974, 1975, and 1976.

Table A3 (continued)

c. Definitions for cash and accounts receivable are those used in Statistics of Income.

d. "Other net current assets" is defined as: "Assets not allocated to a specific current account in the return form balance sheet, and assets specifically reported as short-term by the corporation, as well as marketable securities other than Government obligations..." (Statistics of Income, 1968, Corporation Income Tax Returns, p. 166.)

e. Statistics of Income does not give figures for land and intangibles for NFCs directly. The figures for financial corporations were subtracted from the total of all corporations to derive an estimate of the NFC total.

f. Column 6 was obtained by adding columns 2, 3, 4, and 5, averaging beginning-and-end-of-year values. Column 7 is the sum of columns 1 and 6.

Table A4a

Operating Income of Nonfinancial Corporations, 1929 to 1976, Standard Case

Straight-line Depreciation,

Service Lives 85 Percent of Bulletin F

(billions of current dollars)

Year	1. Adjusted Profits Before Tax[ab]	2. Net Interest[b]	3. Operating Income Before Tax = (1) + (2)[b]	4. Corporation Income Taxes[b]	5. Operating Income After Tax = (3) - (4)[b]
1929	$7.6	$1.4	$9.0	$1.2	$7.8
1930	5.3	1.6	6.9	0.7	6.2
1931	1.2	1.8	3.0	0.5	2.5
1932	-1.9	1.7	-0.2	0.3	-0.5
1933	-2.0	1.7	-0.3	0.5	-0.8
1934	0.6	1.6	2.2	0.7	1.5
1935	2.0	1.6	3.6	0.9	2.7
1936	4.0	1.6	5.6	1.3	4.3
1937	4.7	1.6	6.3	1.4	4.9
1938	2.7	1.5	4.2	0.9	3.3
1939	4.3	1.5	5.8	1.4	4.4
1940	7.5	1.4	8.9	2.7	6.2
1941	12.8	1.3	14.1	7.5	6.6
1942	17.9	1.3	19.2	11.2	8.0
1943	22.0	1.1	23.1	13.8	9.3
1944	21.7	1.0	22.7	12.6	10.1
1945	17.2	1.0	18.2	10.2	8.0
1946	14.1	0.7	14.8	8.6	6.2
1947	19.9	0.8	20.7	10.8	9.9
1948	25.8	0.9	26.7	11.8	14.9
1949	23.0	1.0	24.0	9.3	14.7
1950	29.6	0.9	30.5	16.9	13.6
1951	33.4	1.1	34.5	21.2	13.3
1952	30.3	1.2	31.5	17.8	13.7
1953	29.9	1.3	31.2	18.5	12.7
1954	28.6	1.6	30.2	15.6	14.6
1955	38.2	1.6	39.8	20.2	19.6
1956	36.1	1.7	37.8	20.1	17.7
1957	35.0	2.2	37.2	19.1	18.1
1958	30.1	2.7	32.8	16.2	16.6
1959	39.7	3.1	42.8	20.7	22.1
1960	37.4	3.5	40.9	19.2	21.7

Table A4a (continued)

Year	1. Adjusted Profits Before Tax[ab]	2. Net Interest[b]	3. Operating Income Before Tax = (1) + (2)[b]	4. Corporation Income Taxes[b]	5. Operating Income After Tax = (3) - (4)[b]
1961	37.4	3.9	41.3	19.5	21.8
1962	44.9	4.5	49.4	20.6	28.8
1963	50.0	4.8	54.8	22.8	32.0
1964	56.7	5.3	62.0	24.0	38.0
1965	66.1	6.1	72.2	27.2	45.0
1966	71.2	7.4	78.6	29.5	49.1
1967	67.2	8.7	75.9	27.7	48.2
1968	72.1	10.1	82.2	33.6	48.6
1969	66.4	13.1	79.5	33.3	46.2
1970	51.6	17.0	68.6	27.3	41.3
1971	58.7	17.9	76.6	29.9	46.7
1972	72.0	19.1	91.1	33.5	57.6
1973	76.0	23.1	99.1	39.6	59.5
1974	59.6	29.0	88.6	42.6	46.0
1975	72.5	30.8	103.5	39.7	63.6
1976	95.8	35.8	131.6	54.0	77.6

[a] Corporate profits with inventory valuation adjustments and capital consumption adjustments.

b. Columns 1, 2 and 4 for 1973 and 1974 are from Survey of Current Business, July, 1976; data for 1975 and 1976 are from Survey of Current Business, April, 1977. Data for 1929-72 are from United States Department of Commerce, Bureau of Economic Analysis, The National Income and Product Accounts of the United States, 1929-74, Statistical Tables. Column 3 is the sum of columns 1 and 2. Column 5 is column 3 less 4, although columns 5 and 4 do not, in all cases, add exactly to column 3, due to rounding.

Table A4b

Operating Income of Nonfinancial Corporations, 1946 to 1972

Double Declining Balance Depreciation,
Service Lives 85 Percent of Bulletin F

(billions of current dollars)

Year	1. Adjusted Profits Before Tax[ab]	2. Net Interest[c]	3. Operating Income Before Tax = (1) + (2)	4. Corporation Income Taxes[c]	5. Operating Income After Tax = (3) - (4)
1946	$13.9	$0.7	$14.6	$8.6	$6.0
1947	19.3	0.8	20.1	10.8	9.3
1948	24.9	0.9	25.8	11.8	14.0
1949	22.0	1.0	23.0	9.3	13.7
1950	28.6	0.9	29.5	16.9	12.6
1951	32.4	1.1	33.5	21.2	12.3
1952	29.3	1.2	30.5	17.8	12.7
1953	28.7	1.3	30.0	18.5	11.5
1954	27.4	1.6	29.0	15.6	13.4
1955	37.1	1.6	38.7	20.2	18.5
1956	34.6	1.7	36.3	20.1	16.2
1957	33.2	2.2	35.4	19.1	16.3
1958	28.4	2.7	31.1	16.2	14.9
1959	38.2	3.1	41.3	20.7	20.6
1960	36.1	3.5	39.6	19.2	20.4
1961	36.2	3.9	40.1	19.5	20.6
1962	43.6	4.5	48.1	20.6	27.5
1963	48.7	4.8	53.5	22.8	30.7
1964	55.1	5.3	60.4	24.0	36.4
1965	64.0	6.1	70.1	27.2	42.9
1966	68.3	7.4	75.7	29.5	46.2
1967	63.6	8.7	72.3	27.7	44.6
1968	68.1	10.1	78.2	33.6	44.6
1969	61.9	13.1	75.0	33.3	41.7
1970	46.9	17.0	63.9	27.3	36.6
1971	54.2	17.9	72.1	29.9	42.2
1972	67.5	19.1	86.6	33.5	53.1

a. Corporate profits with inventory valuation adjustment and capital consumption adjustments.

b. Data for column 1 are from Survey of Current Business, March 1976, p. 56, line 14.

c. See notes for Table A4a for columns 2 and 4.

Table A4c

Operating Income of Nonfinancial Corporations, 1946 to 1972

Straight Line Depreciation, Service Lives Shifting from 100 to 75 Percent of Bulletin F

(billions of current dollars)

Year	1. Adjusted Profits Before Tax [ab]	2. Net Interest [a]	3. Operating Income Before Tax = (1) + (2)	4. Corporation Income Taxes [c]	5. Operating Income After Tax = (3) - (4)
1946	$14.0	$0.7	$14.7	$8.6	$6.1
1947	19.8	0.8	20.6	10.8	9.8
1948	25.7	0.9	26.6	11.8	14.8
1949	22.9	1.0	23.9	9.3	14.6
1950	29.5	0.9	30.4	16.9	13.5
1951	33.2	1.1	34.3	21.2	13.1
1952	30.1	1.2	31.3	17.8	13.5
1953	29.5	1.3	30.8	18.5	12.3
1954	28.1	1.6	29.7	15.6	14.1
1955	37.5	1.6	39.1	20.2	18.9
1956	35.1	1.7	36.8	20.1	16.7
1957	33.6	2.2	35.8	19.1	16.7
1958	28.5	2.7	31.2	16.2	15.0
1959	37.9	3.1	41.0	20.7	20.3
1960	35.4	3.5	38.9	19.2	19.7
1961	35.2	3.9	39.1	19.5	19.6
1962	42.3	4.5	46.8	20.6	26.2
1963	47.4	4.8	52.2	22.8	29.4
1964	53.9	5.3	59.2	24.0	35.2
1965	63.1	6.1	69.2	27.2	42.0
1966	67.8	7.4	75.2	29.5	45.7
1967	63.7	8.7	71.4	27.7	44.9
1968	68.4	10.1	78.5	33.6	44.7
1969	62.3	13.1	75.4	33.3	42.1
1970	47.2	17.0	64.2	27.3	36.9
1971	54.2	17.9	72.1	29 9	42.2
1972	67.3	19.1	86.4	33.5	52.9

Notes

a. Corporate profits with inventory valuation adjustment and capital consumption adjustments.

b. Data for column 1 are from Survey of Current Business, March, 1976, p. 56, line 14.

c. See notes for Table A4a for columns 2 and 4.

Table A4d

Operating Income of Nonfinancial Corporations, 1946 to 1972

Historical Cost Depreciation,
Service Lives 85 Percent of Bulletin F

(billions of current dollars)

Year	1. Adjusted Profits Before Tax[ab]	2. Net Interest[c]	3. Operating Income Before Tax = (1) + (2)	4. Corporation Income Taxes[c]	5. Operating Income After Tax = (3) - (4)
1946	$21.4	$0.7	$22.1	$8.6	$13.5
1947	28.7	0.8	29.5	10.8	18.7
1948	31.5	0.9	32.4	11.8	20.6
1949	24.6	1.0	25.6	9.3	16.3
1950	38.2	0.9	39.1	16.9	22.2
1951	39.1	1.1	40.2	21.2	19.0
1952	33.8	1.2	35.0	17.8	17.2
1953	35.4	1.3	36.7	18.5	18.2
1954	33.2	1.6	34.8	15.6	19.2
1955	44.3	1.6	45.9	20.2	25.7
1956	44.2	1.7	45.9	20.1	25.8
1957	42.5	2.2	44.7	19.1	25.6
1958	36.4	2.7	39.1	16.2	22.9
1959	46.1	3.1	49.2	20.7	28.5
1960	43.4	3.5	46.9	19.2	27.7
1961	42.4	3.9	46.3	19.5	26.8
1962	49.4	4.5	53.9	20.6	33.3
1963	54.4	4.8	59.2	22.8	36.4
1964	61.1	5.3	66.4	24.0	42.4
1965	71.9	6.1	78.0	27.2	50.8
1966	77.5	7.4	84.9	29.5	55.4
1967	74.0	8.7	82.7	27.7	55.0
1968	81.6	10.1	91.7	33.6	58.1
1969	79.6	1.31	92.7	33.3	59.4
1970	66.4	17.0	83.4	27.3	56.1
1971	75.2	17.9	93.1	29.9	63.2
1972	91.1	19.1	110.2	33.5	76.7

a. Corporate profits excluding inventory valuation adjustment.

b. Data for column 1 are equal to line 5 of table 3 in Survey of Current Business, March, 1976, p. 56, minus line 33 of Table 1.15, Survey of Current Business, January 1976 (Part II), pp. 24-25.

c. See notes for Table A4a for columns 2 and 4.

Table A5

Estimated Real Holding Gains on Capital
Stock of Nonfinancial Corporations, 1930 to 1976

Year	Year-End Stock in Current Dollars[a]	Year-End Stock in Constant Dollars[b]	Percent Change in Consumer Price Index[c]	Percent Holding Gain[d]	Dollar Holding Gain[e]
1929	$68.0	$255.9	0.		
1930	64.8	258.0	-6.0	0.6	$0.4
1931	57.8	252.3	-9.5	0.9	0.5
1932	51.8	240.8	-10.3	4.6	2.5
1933	50.5	229.8	0.5	1.7	0.9
1934	50.2	220.7	2.0	-1.9	-0.9
1935	49.6	213.6	3.0	-1.0	-0.5
1936	51.9	210.8	1.2	4.8	2.4
1937	54.6	211.6	3.1	1.7	0.9
1938	53.2	207.1	-2.8	2.4	1.3
1939	53.0	204.3	-0.5	1.5	0.8
1940	56.3	205.1	1.0	4.7	2.6
1941	62.9	208.6	9.7	0.2	0.1
1942	67.1	204.4	9.3	-0.4	-0.2
1943	67.6	197.6	3.2	1.0	0.7
1944	68.3	194.1	2.1	0.8	0.5
1945	74.3	197.9	2.3	4.3	3.1
1946	89.7	212.6	18.2	-4.9	-4.0
1947	110.8	233.6	9.0	3.1	3.2
1948	125.6	250.9	2.7	2.8	3.3
1949	130.2	260.3	-1.8	1.7	2.2
1950	147.2	270.1	5.8	3.0	4.2
1951	158.0	282.3	5.9	-3.0	-4.6
1952	173.1	292.8	0.9	4.7	7.8
1953	182.8	305.2	0.6	0.7	1.3
1954	191.3	314.9	-0.5	1.9	3.6
1955	208.9	327.3	0.4	4.6	9.3
1956	232.5	342.6	2.9	3.4	7.4
1957	250.4	357.2	3.0	0.3	0.7
1958	258.4	363.7	1.8	-0.4	-1.0
1959	266.6	371.5	1.5	-0.5	-1.2
1960	274.4	382.1	1.5	-1.4	-3.7
1961	280.6	391.4	0.7	.9	-2.5
1962	290.5	404.4	1.2	-1.0	-2.8
1963	301.3	417.6	1.6	-1.2	-3.5
1964	317.6	435.3	1.2	-.2	-0.5
1965	344.2	461.6	1.9	0.3	1.0

Table A5 (continued

Year	Year-End Stock in Current Dollars	Year-End Stock in Constant Dollars	Percent Change in Consumer Price Index	Percent Holding Gain	Dollar Holding Gain
1966	379.8	493.2	3.4	-.1	-.4
1967	415.6	520.1	3.0	.7	2.8
1968	460.0	547.4	4.7	.4	1.7
1969	514.6	576.7	6.1	.1	.4
1970	565.0	599.0	5.5	.2	1.3
1971	610.3	618.7	3.4	1.2	6.8
1972	664.0	642.1	3.4	1.4	8.9
1973	763.1	673.1	8.8	.8	5.7
1974	899.6	701.1	12.2	1.5	12.5
1975	994.4	711.9	7.0	2.4	22.7
1976	1051.4	723.0	4.8	-1.9	-19.4

a. Current dollar stock is the sum of columns 1 and 2, Table A2a.

b Constant dollar stock includes both residential and nonresidential capital. Data from Capital in the United States [3], p. 61 and 285. Data for 1974 to 1976 form Survey of Current Business, August, 1977, p. 57.

c. Change in consumer price index. Taken from Ibbotsen and Sinquefield [14], Table A-5, pp. 80-81.

d Percent Holding Gain. Computed as follows. Let:

g_{CUR} = annual rate of increase of the current dollar stock,

g_{CON} = annual rate of increase of the constant dollar stock,

g_{CPI} = annual rate of increase of the consumer price index.

g_p = annual rate of increase in the underlying price index for capital stock.

g_p is actually a weighted average of several indexes. There is no way to observe it directly. However, it can be inferred from g_{CUR} and g_{CON}, since

$$1 + g_p = \frac{(1 + g_{CUR})}{(1 + g_{CON})}$$

g_p is the nominal capital gain realized by owners of capital stock. The real capital gain is found by dividing $1 + g_p$ by $1 + g_{CPI}$ and subtracting one.

$$\left.\begin{array}{l}\text{Real Capital Gains as} \\ \text{a Proportion of Start-} \\ \text{of-Year Capital Stock}\end{array}\right\} = \frac{(1 + g_p)}{(1 + g_{CPI})} - 1$$

$$= \frac{(1 + g_{CUR})}{(1 + g_{CON})(1 + g_{CPI})} - 1.$$

Table A5 - Sources (continued)

e. Dollar holding gain is the product of the fourth column (Percent holding gain) and the average net fixed capital stock in current dollars, as given in Table A2a.

Table A6

Estimated Real Holding Gains on Inventory
of Nonfinancial Corporations, 1946 to 1976

Year	Inventory Valuation Adjustment [a]	Mid-Year Inventory [b]	Percent Change in Consumer Price-Index [c]	Real Holding Gain [d]
1946	$5.3	$36.4	18.2%	$-1.3
1947	5.9	46.3	9.0	1.7
1948	2.2	52.6	2.7	0.8
1949	-1.9	52.5	-1.8	-1.0
1950	5.0	55.6	5.8	1.8
1951	1.2	65.5	5.9	-2.7
1952	-1.0	71.5	0.9	-1.6
1953	1.0	73.0	0.6	0.6
1954	0.3	73.0	-0.5	0.7
1955	1.7	75.7	0.4	1.4
1956	2.7	83.4	2.9	0.3
1957	1.5	88.3	3.0	-1.1
1958	0.3	86.9	1.8	-1.3
1959	0.5	90.5	1.5	-0.9
1960	-0.3	95.6	1.5	-1.7
1961	-0.1	95.2	0.7	-0.8
1962	-0.1	100.9	1.2	-1.3
1963	0.2	106.3	1.6	-1.5
1964	0.5	112.3	1.2	-0.9
1965	1.9	121.7	1.9	-0.4
1966	2.1	134.8	3.4	-2.5
1967	1.7	148.6	3.0	-2.8
1968	3.4	165.1	4.7	-4.4
1969	5.5	175.8	6.1	-5.2
1970	5.1	189.2	5.5	-5.3
1971	5.0	199.1	3.4	-1.8
1972	6.6	209.6	3.4	-0.5
1973	18.4	236.4	8.8	-2.4
1974	38.5	300.7	12.2	1.8
1975	11.4	322.0	7.0	-11.1
1976	14.6	352.4	4.8	-2.3

a. Inventory Valuation Adjustment (IVA) from NIPA accounts annually.

b. Mid-Year Inventory data. See Table A2a.

c. Change in Consumer Price Index is taken from Ibbotsen and Sinquefield [14], Table A-5, pp. 80-81.

d. Real Holding Gain is computed as IVA (column 1) less the product of Mid-year Inventory (column 2) and the percent change in the consumer price index (column 3).